Overland Storage

SnapSAN® S3000/S5000 Disk Array

User Guide

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Overland Storage, Inc.
9112 Spectrum Center Blvd.
San Diego, CA 92123
U.S.A.

Tel: 1.877.654.3429 (toll-free U.S.)
Tel: +1.858.571.5555 Option 5 (International)
Fax: +1.858.571.0982 (general)
Fax: +1.858.571.3664 (sales)
www.overlandstorage.com

Preface

This user guide explains how to install, setup, and use your new Overland SnapSAN Manager Server software and its SnapSAN S3000/S5000 disk array to perform tasks such as create arrays and logical volumes, modify configuration settings, and take snapshots.

This guide assumes that you are familiar with computer hardware, data storage, and network administration terminology and tasks. It also assumes you have basic knowledge of Internet SCSI (iSCSI), Serial-attached SCSI (SAS), Serial ATA (SATA), Storage Area Network (SAN), and Redundant Array of Independent Disks (RAID) technology.

Product Documentation and Firmware Updates

Overland Storage SnapSAN product documentation and additional literature are available online, along with the latest release of the SnapSAN S3000/S5000 software.

Point your browser to:

http://docs.overlandstorage.com/snapsan

Follow the appropriate link to download the **latest** software file or document. For additional assistance, search at http://support.overlandstorage.com.

Overland Technical Support

For help configuring and using your SnapSAN S3000/S5000, search for help at:

http://support.overlandstorage.com/kb

You can email our technical support staff at techsupport@overlandstorage.com or get additional technical support information on the Contact Us web page:

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Conventions

This user guide exercises several typographical conventions:

Convention	Description & Usage
Boldface	Words in a boldface font (**Example**) indicate items to select such as menu items or command buttons.
Ctrl-Alt-r	This type of format details the keys you press simultaneously. In this example, hold down the **Ctrl** and **Alt** keys and press the **r** key.
NOTE	A Note indicates neutral or positive information that emphasizes or supplements important points of the main text. A note supplies information that may apply only in special cases—for example, memory limitations or details that apply to specific program versions.
IMPORTANT	An Important note is a type of note that provides information essential to the completion of a task or that can impact the product and its function.
CAUTION	A Caution contains information that the user needs to know to avoid damaging or permanently deleting data or causing physical damage to the hardware or system.
WARNING	A Warning contains information concerning personal safety. Failure to follow directions in the warning could result in bodily harm or death.
Menu Flow Indicator (**>**)	Words in bold font with a greater than sign between them indicate the flow of actions to accomplish a task. For example, **Setup > Passwords > User** indicates that you should press the Setup button, then the Passwords button, and finally the User button to accomplish a task.

Information contained in this guide has been reviewed for accuracy, but not for product warranty because of the various environments, operating systems, or settings involved. Information and specifications may change without notice.

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Chapter 1

Overview

SnapSAN S3000/S5000

This manual describes how to use the Overland Storage SnapSAN S3000/S5000 system. The appliance together with the SnapSAN S3000/S5000 software provides a flexible, intelligent, iSCSI-based storage area network (SAN) solution for virtualized server environments and the growing demand for data storage. With a SnapSAN S3000/S5000 appliance, you can store, share, protect, and manage data through a single easy-to-use Windows or web interface.

Figure 1-1: SnapSAN S3000/S5000 24-Slot and 12-Slot Models

Features

High Performance and Large Capacity

- The disk array supports the following host interfaces:
  - Fibre channel (FC-AL/Fabric, 8Gbps)
  - iSCSI (1Gbps, 10Gbps)
- The disk array supports the following disk drives:
  - 300 GB (15Krpm), 450 GB (15Krpm), 600 GB (15Krpm), and encryption 600 GB (15Krpm) 3.5 inch SAS disk drives
  - 300 GB (10Krpm), 450 GB (10Krpm), 600 GB (10Krpm), and encryption 600 GB (10Krpm) 2.5 inch SAS disk drives
  - 1 TB (7.2Krpm) and 2 TB (7.2Krpm) 3.5 inch NL-SAS disk drives
  - 1 TB (7.2Krpm) 2.5 inch NL-SAS disk drive
  - 400 GB 3.5 inch SSD
- On the SnapSAN 3000 up to 96 disk drives can be installed.
  On the SnapSAN 5000, up to 144 disk drives can be installed when using a 2.5-inch disk drive. When using a 3.5-inch disk drive, up to 96 disk drives can be installed.

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- SAS disk drives, NL-SAS disk drives and SSDs can be installed together on a disk enclosure.

The disk array can be connected as a storage system AIX servers.

Other Features

- Key components such as controllers, cache memories, power supplies and fans are redundantly configured.
- Cache data is dually written to controllers. Even if a controller fails, integrity of the data on the caches of the other controller is maintained.
- Data on caches is automatically saved in the internal flash memory by using the battery power when a power outage occurs.
- The disk array supports RAID-1,TM, 5, 6, 10, 50, and 60. Even if a disk drive fails, operation can be continued without causing data loss.
- Multiple hot spare disks can be configured.

Additional features are described in Appendix A, “Specifications”.

Operation Management

SnapSAN Manager allows for basic configuration set up, status display and status monitoring. The SnapSAN Manger Server program (not included), allows for centralized management of multiple disk array controllers and use of function extension programs.

Components

Disk Array Controller

This section describes names and functions of disk array components.

Front View

Figure 1-2: 2.5 Inch Disk Drive Model

Figure 1-3: 3.5 Inch Disk Drive Model

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Figure 1-4: Front Bezel (Optional)

Figure 1-5: Disk Drive Front View

Rear View

The following graphic shows the rear view of a SnapSAN disk array with the power supplies on top and controllers on the bottom (SAS 4-port controllers used in this example).

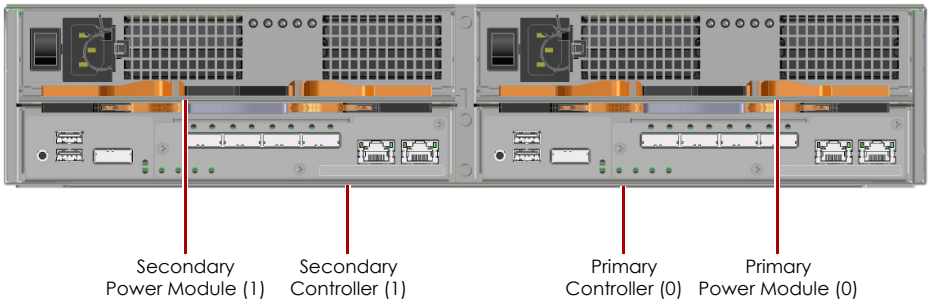

Figure 1-6: Rear View of Disk Array Controller

Item	Description
(1) Power supply (PS0/PS1)	Two power supplies are installed on a disk array.
(2) Controller (CONT0/CONT1)	Two controllers are installed on a disk array.

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Power Supply

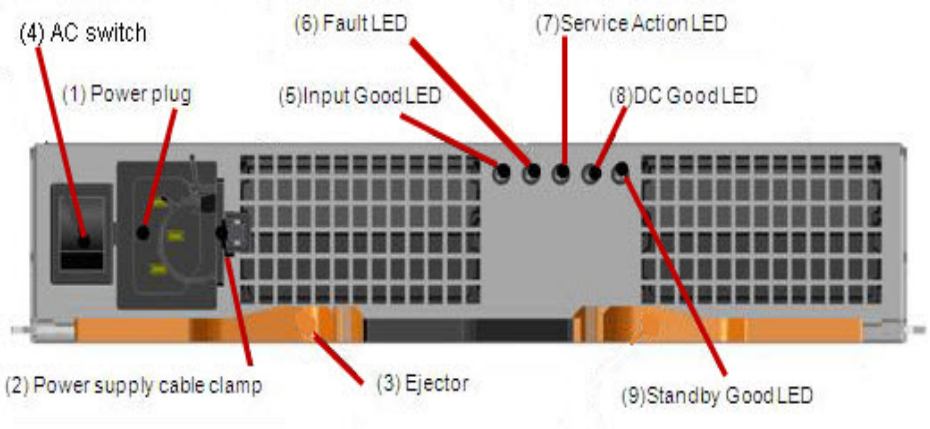

Figure 1-7: AC Power Supply

Item	Description
(1) Power Plug	Use the power cable shipped together with the disk array for supplying power to the disk array.
(2) Power Cable Clamp	The power cable clamp prevents the power cable from coming off unintentionally.
(3) Ejector	The ejector is used to install and remove a power supply.
(4) AC Switch	The AC switch is used to power on and off input of power supply.

LED	Light Color	Description
(5) Input Good LED	Green	This LED is On if power is supplied when the AC switch is turned on.
(6) Fault LED	Orange	This LED is On when an error is detected.
(7) Service Action LED	Blue	This LED is not used in this disk array system. The LED is not On all the time.
(8) DC Good LED	Green	This LED is On when DC output is normal.
(9) Standby Power Good LED	Green	This LED is On when DC output is in the waiting status.

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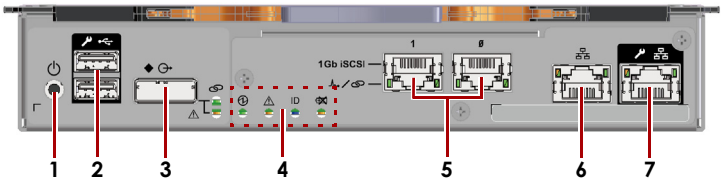
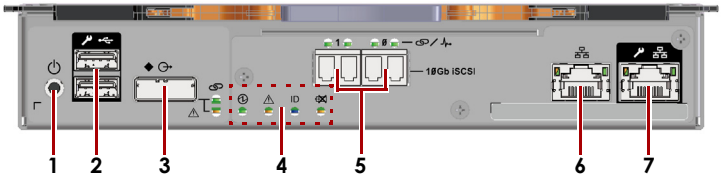
Controller Connections

The connections for the various controllers is shown below.

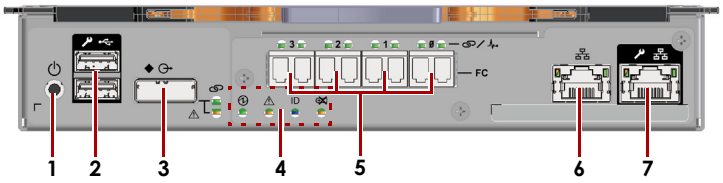
1 GB iSCSI 2-Port Controller



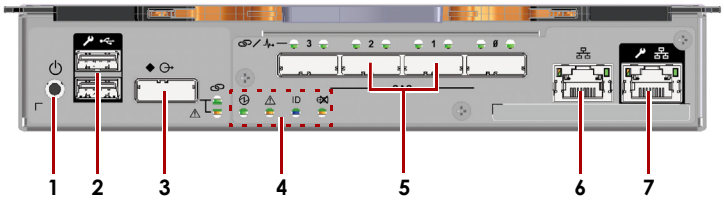
10 GB iSCSI 2-Port Controller



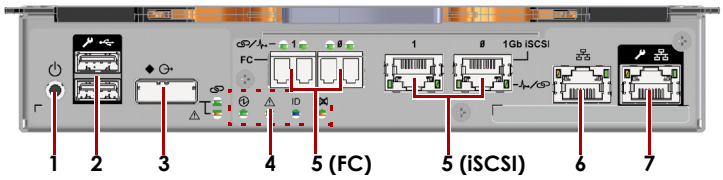
FC Controller, 4-Port (SnapSAN 5000)*



SAS 4-Port Controller



FC 2-Port/1 GB iSCSI 2-Port Controller (SnapSAN 5000 Only)



1 - DC Button
2 - USB Ports
3 - Expansion Port
4 - State LEDs
5 - Host Ports
6 - Management
7 - Maintenance

* SnapSAN 3000 uses a 2-port version of this FC Controller.

Figure 1-8: Available Controllers

Location and Port Number

HP1	HP0

FC 2-port controller

HP3	HP2	HP1	HP0

FC 4-port controller

iHP1	iHP0

1G iSCSI 2-port controller

HP3	HP2	HP1	HP0

SAS 4-port controller

iHP1	iHP0

10G iSCSI 2-port controller

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Item	Description
(1) DC Button	The DC switch is used to start up or shut down the disk array system in non-AC operating mode. In AC operating mode, the DC switch only allows for shutdown of the disk array system. There are two types of shutdown; normal shutdown and forced shutdown. When this switch is pressed four or more seconds, forced shutdown is performed. For information on AC operating mode, see the description about AC operating mode in *"Powering On the Disk Array System"*.
(2) USB Port	These USB 2.0 ports are used for debugging. They are not used under normal operation.
(3) Disk Port	The disk port is used to connect to the next disk enclosure. A controller has one disk port. The port has a fault LED (below the port) and a link LED (above the port).
(4) State Display LED	For details, see *"LED Display"*.
(5) Host Port	Host ports are used to connect hosts. The port connector form, the number of ports and the position of LEDs to show the status vary according to the controller type.
(6) Management Port	The management port is a 10M/100M/1Gbps LAN port used for SnapSAN Manager and SNMP connection. The port has a LINK/ACT LED (right) and an SPEED LED (left).
(7) Maintenance Port	The maintenance port is a 10M/100M/1Gbps LAN port used for connecting a maintenance PC. This connector is not used under ordinary operation. The port has a LINK/ACT LED (right) and an SPEED LED (left).

Disk Enclosure (Optional Component)

This section describes names and functions of disk enclosure components.

Front View

The front view of a disk enclosure is the same as the front view of the disk array controller. (DAC).

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Rear View

Figure 1-9: Disk Enclosure Rear View (with AC Power Supplies)

Label	Description
(1) Power supply (PS0/PS1)	Two power supplies are installed on a disk enclosure.
(2) Adapter (ADP0/ADP1)	Two adapters are installed on a disk enclosure.

Power Supply

Power supplies of a disk enclosure are the same as the power supplies of the disk array controller.

Adapter

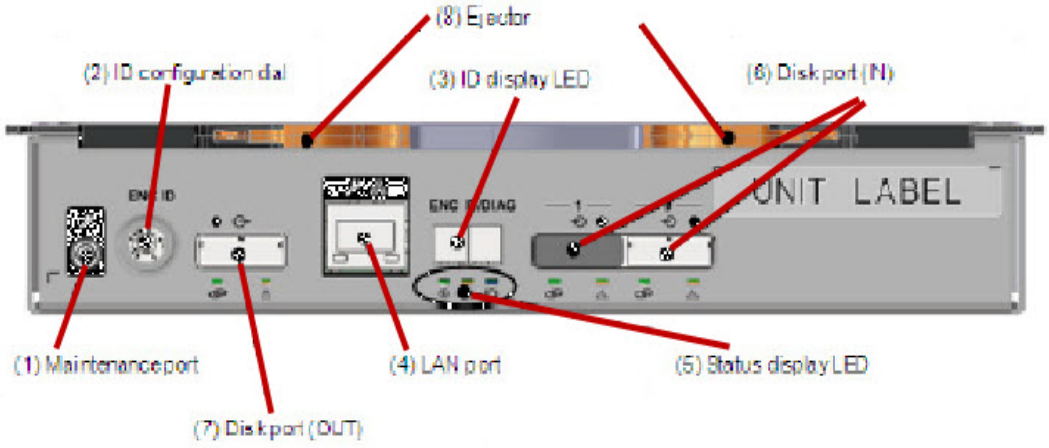

Figure 1-10: Adapter

Item	Description
(1) Maintenance port	This port is for maintenance. This port is not used under normal conditions.
(2) ID configuration dial	The ID configuration dial is not used.
(3) ID display LED	The ID display LED is not used.
(4) LAN port	The LAN port is used for maintenance. It is not used under normal operation.

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Item	Description
(5) Status display LED	For details about the status display LED, see "LED Display".
(6) Disk port (IN)	A disk port (IN) is used to connect the disk array controller or disk enclosure located before the given enclosure. Each adapter has two disk ports for (IN). Typically, only the right (IN) port is used. Each port has a fault LED (right) and a link LED (left).
(7) Disk port (OUT)	The disk port (OUT) is used to connect the disk enclosure behind the given enclosure. Each adapter has one disk port (OUT). Each port has a fault LED (right) and a link LED (left).
(8) Ejector	The ejector is used to attach and remove the adapter.

LED Display

Disk Array Controller, Disk Enclosure, and Disk Drives

The front view of a disk array controller, a disk enclosure and disk drives (without the front bezel).

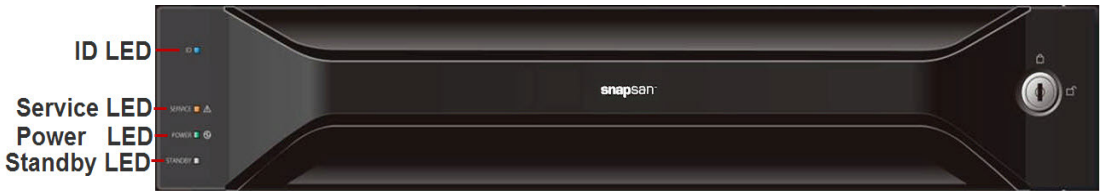

Figure 1-11: Front Bezel (Optional)

LED	Light Color	Description
ID LED	blue	Identifies the unit.
Service LED	orange	Indicates disk array controller.status
Power LED	green	
Standby LED	white	Indicates if the DC off and on operation is available.
Fault LED	green/orange	1/LED disk drive. The LEDs indicate the disk drive status.

Disk Array Controller Power and Disk Enclosure Power

The front view of a disk array controller, a disk enclosure and disk drives (without the front bezel).

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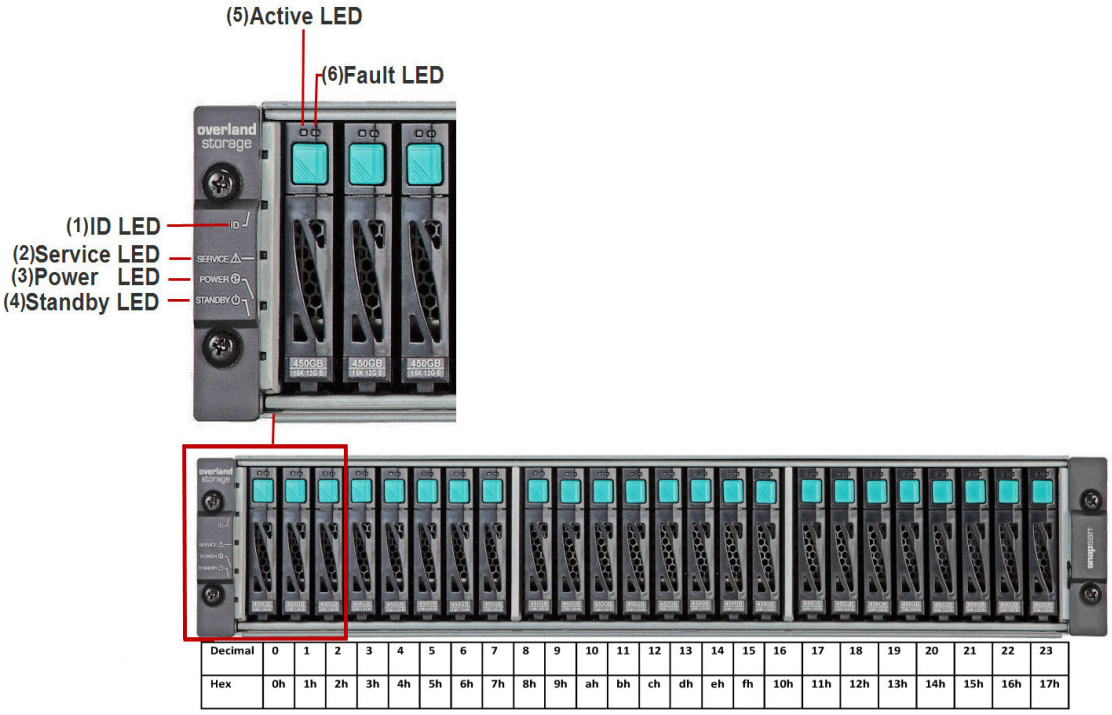
(5)Active LED
(6)Fault LED
(1)ID LED
(2)Service LED
(3)Power LED
(4)Standby LED
Decimal 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hex 0h 1h 2h 3h 4h 5h 6h 7h 8h 9h ah bh ch dh eh fh 10h 11h 12h 13h 14h 15h 16h 17h

Figure 1-12: Front View - 2.5 inch Disk Array Unit LEDs

Figure 1-13: Front View - 3.5 inch Disk Array Unit LEDs

The following tables describe the LEDs for the 2.5 and 3.5 inch Disk Array Units.

LED	Light Color	Description
(1) ID LED	blue	Identifies the unit.
(2) Service LED	orange	Indicates disk array controller.status
(3) Power LED	green	
(4) Standby LED	white	Indicates if the DC off and on operation is available.
(5) Active LED?		

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LED	Light Color	Description
(6) Fault LED	green	1/LED disk drive. The LEDs indicate the disk drive status.
	orange	

When access to a host connection port is disconnected for five minutes, transition to this mode takes place automatically in preparation for power-off. When access from the host connection port is restored, ordinary status is restored.

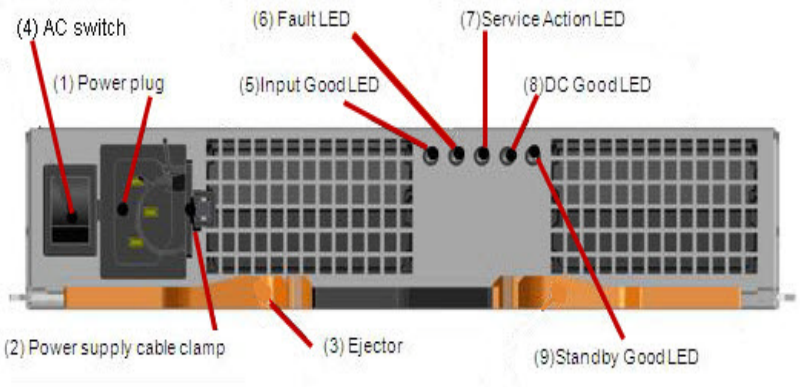

Figure 1-14: AC Power Supply

LED	Light Color	Description
(5) Input good LED	Green	
(6) Fault LED	Orange	
(7) Service action LED	Blue	On when directed by a device connected to a port or the system.
(8) DC good LED	Green	
(9) Standby good LED	Green	Indicates if the AC off and on operation is available.

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Controller (CONT)

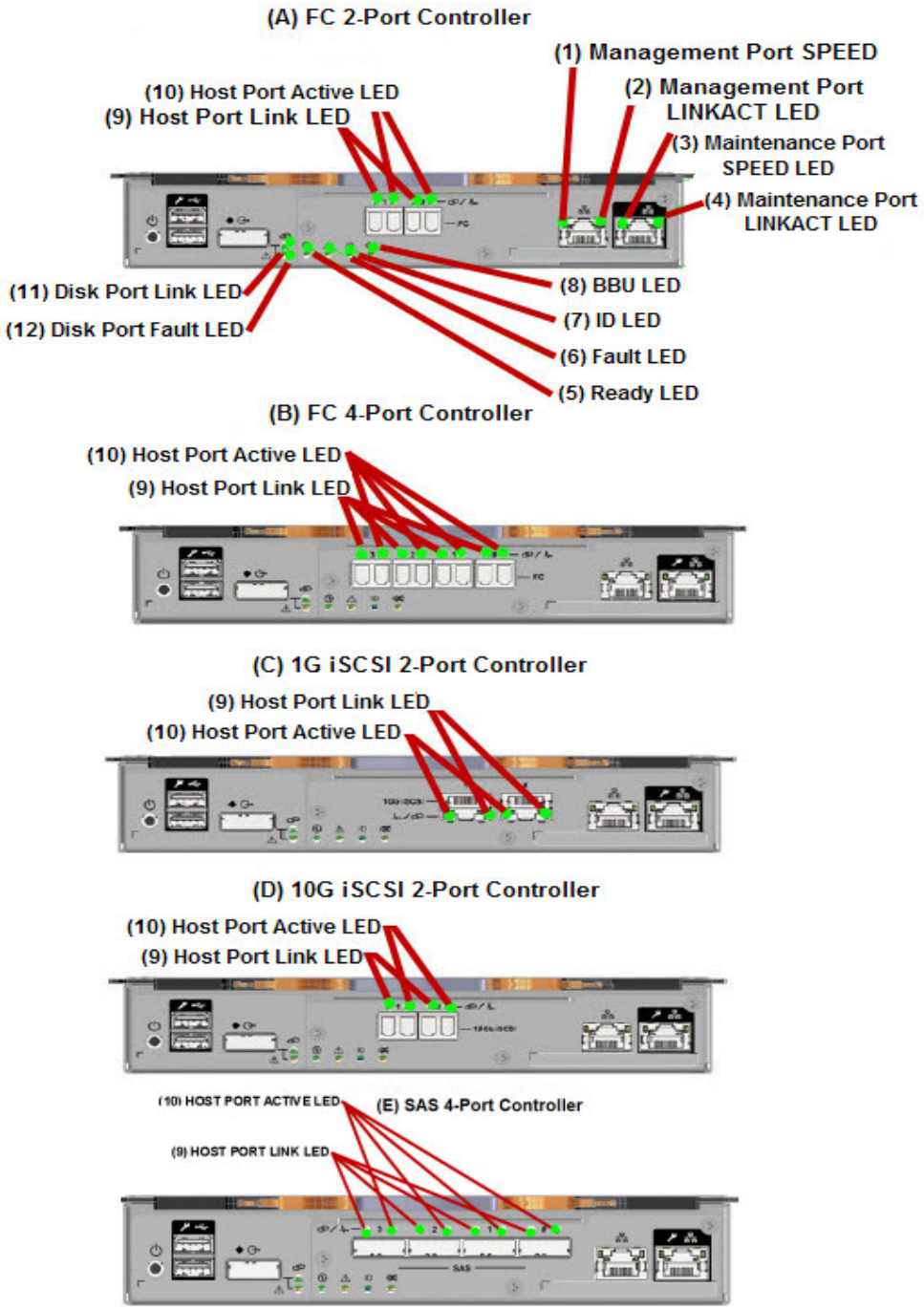
(A) FC 2-Port Controller
(1) Management Port SPEED
(10) Host Port Active LED
(9) Host Port Link LED
(2) Management Port LINKACT LED
(3) Maintenance Port SPEED LED
(4) Maintenance Port LINKACT LED
(11) Disk Port Link LED
(12) Disk Port Fault LED
(8) BBU LED
(7) ID LED
(6) Fault LED
(5) Ready LED
(B) FC 4-Port Controller
(10) Host Port Active LED
(9) Host Port Link LED
(C) 1G iSCSI 2-Port Controller
(9) Host Port Link LED
(10) Host Port Active LED
(D) 10G iSCSI 2-Port Controller
(10) Host Port Active LED
(9) Host Port Link LED
(10) HOST PORT ACTIVE LED
(E) SAS 4-Port Controller
(9) HOST PORT LINK LED

Figure 1-15: LED Display - Disk Array Controller (CONT)

LED	Light Color	Description
(1) Management port SPEED LED	(green/orange)	On in green when operating at 100 Mbps.:
(2) Management port LINK/ACT LED	(green)	On when connected.

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LED	Light Color	Description
(3) Maintenance port SPEED LED	(green/orange)	On in orange, when operating at 1 Gbps:
(4) Maintenance port LINK/ACT LED	(green)	Flashes when data is transferred.
(5) Ready LED	Green	
(6) Fault LED	Orange	
(7) ID LED	Blue	
(8) BBU LED	Orange	
(9) Link LED (L)	(green)	
(10) Active LED (A)	(green)	
(11) Link LED (LNK)	(Green)	
(12) Fault LED (FLT)	(Orange)	

Adapter (ADP)

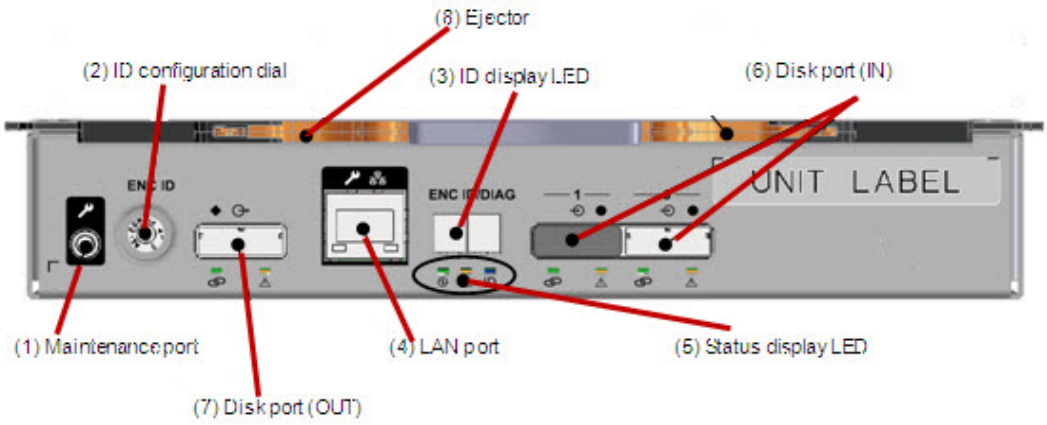

Figure 1-16: LED Display - Disk Array Enclosure Adapter

LED	Light Color	Description
(1) Management port SPEED LED	(green/orange)	On in green when operating at 100 Mbps.:
(2) Management port LINK/ACT LED	(green)	On when connected.
(3) Maintenance port SPEED LED	(green/orange)	On in orange, when operating at 1 Gbps:
(4) Maintenance port LINK/ACT LED	(green)	Flashes when data is transferred.
(5) Ready LED	Green	
(6) Fault LED	Orange	
(7) ID LED	Blue	

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Chapter 2

Basic Operations

Basic Operation

Powering On the Disk Array System

AC Operating Mode

The disk array controller has a mechanism that powers the unit on automatically.AC operating mode is enabled in the factory default settings. AC operating mode can be disabled by issuing a ControlCommand to the disk array controller. When AC operating mode is disabled, the power switch of the disk array controller must be used.

When AC operating mode is disabled, the power control function through AC is not available because the control circuits on the controllers are not powered on.

For information on how to change the factory default settings to disable AC operating mode, see *SnapSAN Manager Software Configuration Setting Tool User's Manual (GUI) for the SnapSAN S3000/S5000.*

Follow the steps below to power on the disk array system:

Step	Operation
1	Verify that the disk array controller and the disk enclosures are correctlY connected. When AC power supplies are installed, verify that the AC switches on the disk array controller and disk enclosures are set to off.
2	When AC power supplies are installed, set the AC switches to on, in the order of the disk enclosure and the disk array controller. When AC operating mode is enabled (factory default settings), the disk array system with AC power supplies is automatically powered on at the time the disk array controller is powered on while the disk array system with DC power supplies is automatically powered on at the time the power supply input cable is connected to the disk array controller or the disk array controller is powered on. Disk enclosures are sequentially powered on in association with the disk array controller. Proceed to step 4. If AC operating mode is disabled, proceed to step 3, otherwise proceed to step 4.
3	Step 2 should be performed only when AC operating mode is disabled. Press the DC button of a controller (CONT), which is located at the rear of the disk array controller, for approximately one second until fans start to rotate. The disk array controller will be powered on. The disk enclosures will be powered on sequentially as the disk array controller is powered on. Proceed to step 4. Push the button of one of the controllers (CONT). You do not need to press switches of both controllers.

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Step	Operation
4	Do not operate the disk array system until the Power LED (green) located at the front of the disk array controller is On and the Service LED (orange) goes off after cyclic flashing. • It takes approximately six (for minimum configuration) to eight (maximum configuration) minutes for initialization and the self test after the power on. During this period, the Service LED (orange) flashes cyclically. • If the Service LED (orange) does not go off and the Power LED (green) is Off after 10 minutes (both LEDs are located at the front of the disk array controller), the disk array system may be failing. • See *Chapter 6, "Troubleshooting."* . If the snapshot function or the data replication function is used, initialization and the self test described above take longer.
5	Power on the application servers (hosts). **NOTE:** Only power on the application servers after the disk array system is successfully started.

Notes on Powering On the Disk Array System

1. When powered on from the battery backup status

   The next backup is not guaranteed while batteries are not fully charged, and data is written to nonvolatile disk drives but not to caches that may get volatilized.

   Discharged batteries, takes a maximum of eight hours to completely charge.

2. Restarting the disk array system after user data loss

   If a loss of data in caches has been experienced and then the disk array controller is powered on, the Service LED on the disk array controller repeats flashing for four seconds and then Off for eight seconds. Follow the steps below to start the disk array system.

Step	Operation
1	Perform power off according to the steps in "Powering On the Disk Array System"
2	Perform power on according to the steps in "Powering On the Disk Array System". • If the disk array system does not start up successfully, it may be failing. • Performance of the disk array system degrades until battery charging is complete, which takes a maximum of eight hours.

3. When the snapshot function is used:

   If the snapshot function is used, updated information is copied from disk drives to the cache memory when the disk array controller is started.Because of this, the disk array controller's start up time is delayed by 10 seconds per 1 TB of the updated information.

Power Control Systems without using Power Switches

Control systems described here are supported only in the SnapSAN 5000.

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Control Systems

Describes power control systems that do not use power switches.

Control system	Host OS	Feature
UPS (Does not work with UPS)	Not specified	This control system is for instantaneous power interruption. Because there is no association, when the retention period of UPS elapses, temporary power-off followed by reboot takes place. Cached data, however, is protected.

Association is a mechanism to notify the disk array system of interruption of the power supply to the UPS and to start shutdown.

If you use the UPS control system, establish redundancy by providing a UPS for each power supply of a device. Make sure that a failure of a single UPS does not cause simultaneous power failure of PS0 and PS1.

Notes on using a UPS and Automatic Operation

AC power off sequence

1 Application server → 2 FC switch → 3 disk array controller → 4 Disk enclosure → 5 Management server.

If multiple disk enclosures are used, you do not need to specify the sequence of power off among the disk enclosures.

Backing up user data

If the power of this disk array system is turned off without going through the power off procedure described in the chapter or the power control systems without using DC buttons section described in this chapter, the user data on caches will be backed up on the flash memory of the unit.

Data will not be lost even if the power is turned off without going through the procedures.

Powering Off the Disk Array System

Follow the steps below to power off the disk array system:

Step	Operation
1	Stop or power off application servers (hosts). Verify that the application servers (hosts) are stopped or powered off.
2	Press the DC button of a controller (CONT) located at the rear of the disk array controller. Then confirm that the Ready LED starts to flash rapidly. Press the DC button of either of the controllers (CONT). You do not need to press buttons of both controllers. If your press the DC buttons for 4 seconds or more, power is forcefully turned off, which may give negative impact on the disk array system.

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Step	Operation
3	Wait for the Power LED (green) located at the front of the disk array controller to go off. • With this process, the disk array controller writes data that is on caches and has not been written to disks to disks. • When writing the data is complete, the disk array system is automatically powered off. • If the Power LED (green) located at the front of the disk array controller does not go off after 10 minutes, the disk array system may be failing. See "Troubleshooting".
4	If necessary, turn off the AC switches of the power on the disk array controller and disk enclosures (only for those with AC power supplies). The power supply of the disk array system can now be stopped.Unlike power on, there is no rules for sequence of stopping.

Notes on Turning Off the AC Power

Notes on using the data replication function

The update information (storage system information) managed by the data replication function Volume Cloning or (Replication) is created on a replication reserved volume or the cache memory.

If no replication reserved volume has been created, the update information mentioned above is created only on the cache memory. In these circumstances, even if the disk array system is powered off according to the procedure described in this chapter, the status of the disk array system becomes backup status when the disk array system is stopped. If the backup fails, the storage system information is lost and the status of the disk array system becomes one of the following statuses:

Activity	Synchronization	Pair Status
Separate	Separated	All spaces are different. There is no change in the status.
	Separating	The status becomes fault, where copying is stopped.
Replicate	Replicating	All spaces are different. Replication is automatically restarted from the beginning.
	Synchronized	There is no change in the status.
Restore	Restoring	The status becomes fault, where copying is stopped.
	Synchronized	All spaces are different. Replication is automatically restarted from the beginning. There is no change in the status.

For recovery of a pair whose status is fault, perform the following steps for replication.

a. Perform Forced Separate for the RV target.

b. Perform the steps to restore the previous status (Replicate → Separate, or Restore) again.

Copy is started again.

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All the spaces of logical disks are targeted, which means full copy is performed.

- When the replication function is used, it is strongly recommended that a user use the storage system information saving function and create a replication reserved volume by SnapSAN Manager. The capacity of the replication reserved volume will be 8.9 GB.
- Powering off by performing the ordinary steps backs up storage system information (differential map, etc.) in a replication reserved volume. If the disk array system is powered off while no replication reserved volume has been created, the state of the disk array system becomes backup. If no replication reserved volume is used, it is recommended to power on the unit 24 hours.

The storage system information saving function is a function to back up the storage system information such as differential map for business volumes (MV) and replication volumes (RV) to disk drives.

Auto Cache Flush Function

This is a function to automatically save user data, difference map, and configuration information on caches to disk drives when host IO is not issued for five minutes.

If power off takes place without going through the ordinary procedure while data that has not been written is left on caches, the backup function works to protect the data on caches. However, because this backup function saves cached data in the flash memory by using batteries in the disk array system, the data may get lost if battery power is not sufficient and saving data fails.

Auto Cache Flush Function assures data on caches to be written to disk drives and prevents data loss even if a situation mentioned above arises.

Completion of Auto Cache Flush can be checked from high-speed flashing of POWER LED that flashes every 0.2 seconds.

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Chapter 3

SnapSAN Manager Server Installation

This chapter describes the initial steps needed to set up and configure SnapSAN Manager Server. It also describes how to install the SnapSAN Manager Server. Network Setting Tool, and SnapSAN Manager Agent Utility on the application servers.

SnapSAN Manager Server Overview

SnapSAN Manager is a disk array management software program available in two options:

SnapSAN Manager Embedded

- SnapSAN Manager Embedded allows for configuring and managing only a single target disk array.
- SnapSAN Manager Embedded can be used through a Web browser on a SnapSAN Manager Embedded machine with no management server needed.

SnapSAN Manager Server

SnapSAN Manager allows for centralized configuration and management of multiple disk arrays by a single management server.

SnapSAN Manager also allows for integrated management of the entire system by working together with middleware products.

Use latest Java Runtime Environment (JRE) Version

IMPORTANT: Do not use any unsupported OS and JRE combinations.

When any product that uses Java Runtime Environment (JRE) is already installed in the environment where SnapSAN Manager Embedded (WebGUI) is used, the product and SnapSAN Manager Embedded can live together if neither SnapSAN Manager Embedded (WebGUI) or the product is operated on another server or PC.

The latest version of JRE installed in the environment supports SnapSAN Manager Embedded (WebGUI) as well as the product. It is recommended to use the latest version among the supported JRE versions after the installation because the supported versions may include a version for which security vulnerability issue is reported.

For details about security vulnerability see:

- US-CERT: http://www.us-cert.gov
- My Oracle Support: https://support.oracle.com/CSP/ui/flash.html
- Download Java: http://java.com/en/download/index.jsp

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Before Installing SnapSAN Manager Server

Configure Browser

When you use SnapSAN Manager Server or Embedded (Web GUI) in a Windows environment, configure the Web browser (Internet Explorer) as described below. Once the configuration is complete, you do no need to configure the Web browser in subsequent startups of SnapSAN Manager Embedded.

Trusted Site Connection

Follow the steps below to configure the disk array to be connected as Trusted Sites:

1. From Control Panel, select **Internet Options**, and click the **Security** tab.
2. Select the **Trusted sites** icon and click **Sites**.
3. Enter the URL of the disk array to be connected (for example, http://<the IP address (host name) of the disk array to be connected>) in the **Add this website to the zone** box, and click **Add**.
   - The Require server verification (https:) for all sites in this zone check box should be cleared.
4. Click **OK** to close the window.

NOTE: When you are using Internet Explorer Version 7 or later, do not enable Protected Mode of the Trusted sites.

Before Using SnapSAN Manager Embedded (Web GUI) - Configure JRE

Windows Vista or later Environment or a Windows Server 2008 or later Environment

When your environment is Windows, configure Java as well before you start using SnapSAN Manager Embedded (Web GUI). Once the configuration is complete, you do not need to configure Java again in subsequent startups of SnapSAN Manager Embedded.

Disable the auto update function of Java according to the following procedure:

1. Open the **Java Control Panel**.
2. In a Windows Vista or later environment or a Windows Server 2008 or later environment, right-click the icon to start the Web browser to select **Run as administrator.**
3. Use Explorer and execute the following **file** located in the JRE installation folder:
   - C:\Program Files\Java\jre6\bin\javacpl.exe
     (default installation in the 32 bit version OS)
   - C:\Program Files (x86)\Java\jre6\bin\javacpl.exe
     (default installation in the 64 bit version)

   IMPORTANT: Alternatively, when you are using a 32-bit version of OS and if Java is in Control Panel, you can use it.
4. Click the **Update** tab and clear the **Check for Updates Automatically** check box.
5. Click **OK** to close the window.

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Windows 7

Disable the next generation Java plug-in according to the following procedure.

1. Open the **Java Control Panel**.

   NOTE: In a Windows Vista or later environment or a Windows Server 2008 or later environment, right-click the icon to start the Web browser to select Run as administrator.

2. Use Explorer and execute the following **file** located in the JRE installation folder:
   - C:\Program Files\Java\jre6\bin\javacpl.exe
     (default installation in the 32 bit version OS)
   - C:\Program Files (x86)\Java\jre6\bin\javacpl.exe
     (default installation in the 64 bit version)
3. Click the **Advanced** tab and clear the **Enable the next-generation Java Plug-in** (requires browser restart) check box.
4. Click **OK** to close the window.

Configure Unit with Network Setting Tool Overview

Option 1A - Public LAN Port

Before installing SnapSAN Manager Server on a host server, the SnapSAN Array will need to have the public LAN and Maintenance ports configured.

There are two ways to configure the public LAN ports on the SnapSAN Array:

"Option 1A Install and Configure the Network Setting Tool on SSMS Server"

The Network Setting Tool can be installed on the same server that SnapSAN Manager Server (SSMS). Once installed, the Network Setting tool sends out a broadcast on the network for the SnapSAN Array to respond. When the SnapSAN Array responds, the installer is able to configure the public LAN ports with a Static IP Address on the SnapSAN controllers.

Option 1B - Maintenance Port

"Option 1B Access the Embedded SnapSAN Manager through a Host"

By connecting a host system to the Maintenance Port, either through controller 0 (10.1.0.10/255.255.255.0) or controller 1 (10.1.0.11)., the installer can configure the SnapSAN Array using the Embedded SnapSAN Manager. The SnapSAN Array has an embedded webserver that allows for limited access and control of the SnapSAN Array.With Embedded SnapSAN Manager, the installer will be able to configure the public LAN ports with Static IP Addresses to each controller.

Option 1A Install and Configure the Network Setting Tool on SSMS Server

1. Connect the ethernet cables to the Public LAN Port on both controllers, if using two controllers.

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2. Power unit on, if not already on.

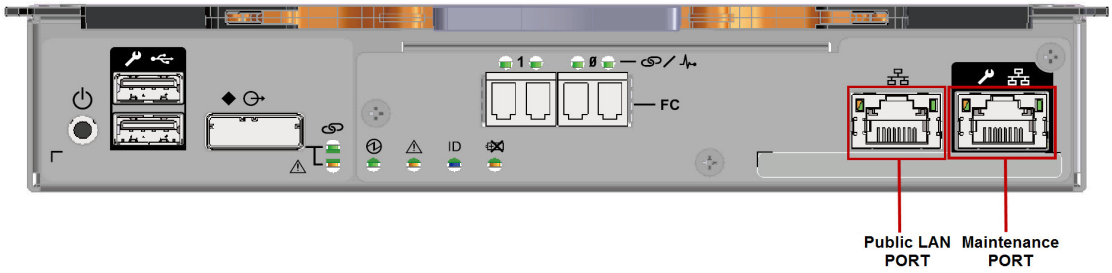


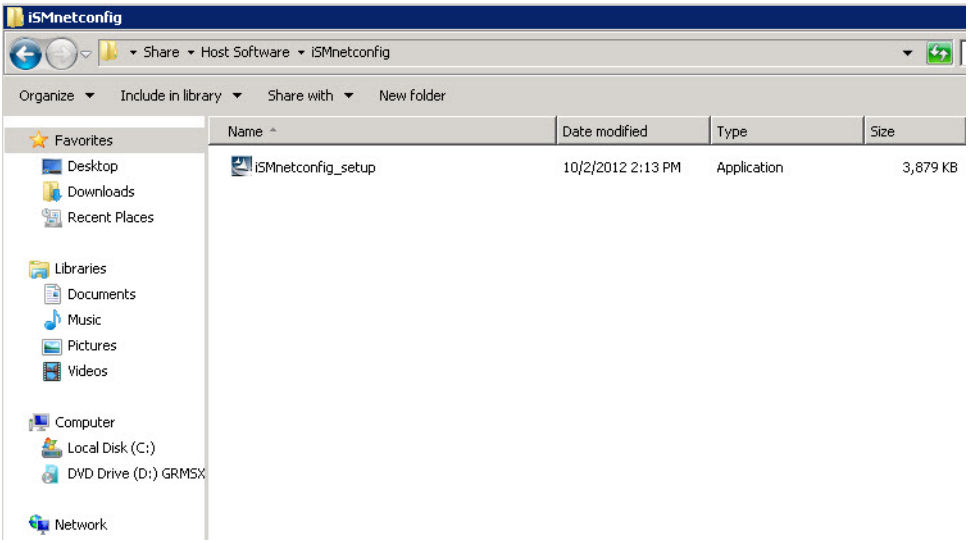
Figure 3-1: Controller 0 - Public LAN Port and Maintenance Port

Network Setting Tool Installation Procedure

Follow the instructions to install the Network Setting Tool.

Option 1A-Install and Configure Network Setting Tool on SSMS Server

1. Click iSMnetconfig_setup.



2. Click Next.

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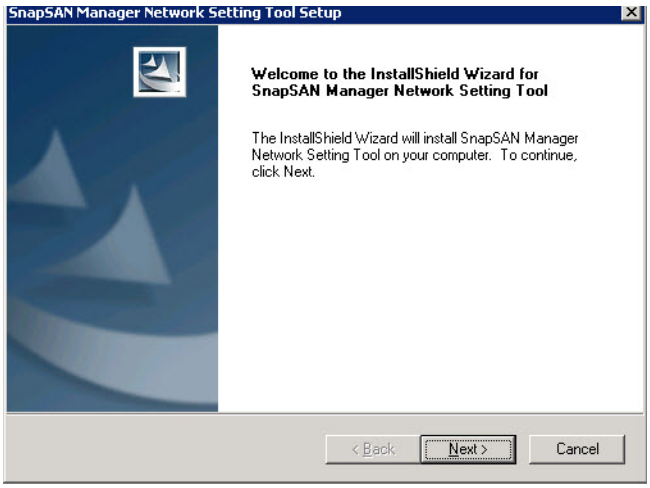
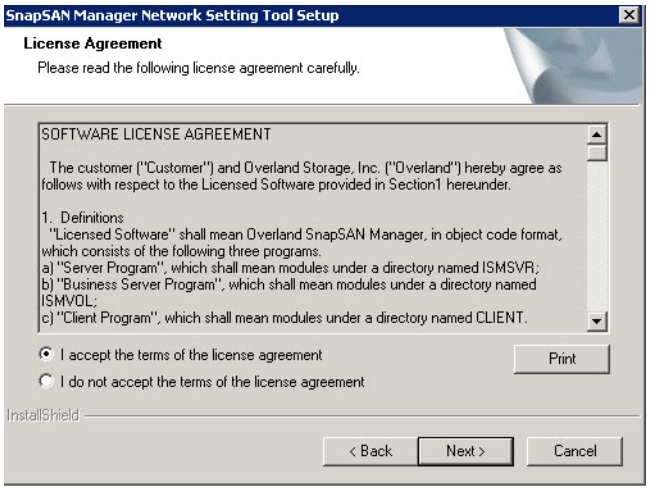
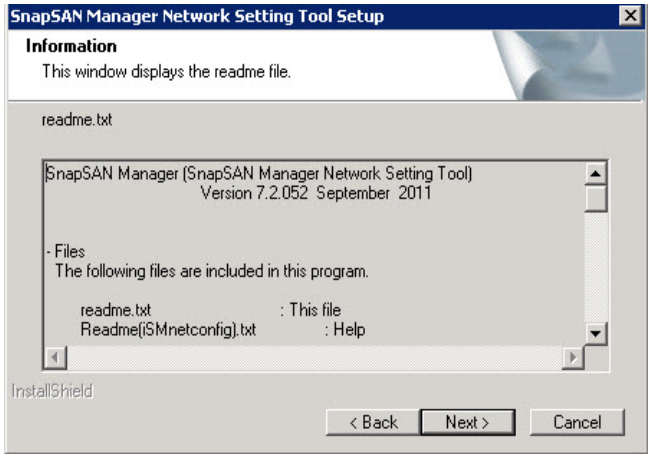

SnapSAN Manager Network Setting Tool Setup
Welcome to the InstallShield Wizard for SnapSAN Manager Network Setting Tool
The InstallShield Wizard will install SnapSAN Manager Network Setting Tool on your computer. To continue, click Next.
< Back
Next >
Cancel

3. Read **Software License Agreement**.
   - If you **accept** the agreement select I accept terms of the license agreement and then click **Next**.
   - If you **do not accept** the agreement, you cannot use the software.


SnapSAN Manager Network Setting Tool Setup
License Agreement
Please read the following license agreement carefully.
SOFTWARE LICENSE AGREEMENT
The customer ("Customer") and Overland Storage, Inc. ("Overland") hereby agree as follows with respect to the Licensed Software provided in Section1 hereunder.
1. Definitions
"Licensed Software" shall mean Overland SnapSAN Manager, in object code format, which consists of the following three programs.
a) "Server Program", which shall mean modules under a directory named ISMSVR;
b) "Business Server Program", which shall mean modules under a directory named ISMVOL;
c) "Client Program", which shall mean modules under a directory named CLIENT.
I accept the terms of the license agreement
I do not accept the terms of the license agreement
Print
InstallShield
< Back
Next >
Cancel

4. Read **the Readme file** and then click **Next**.



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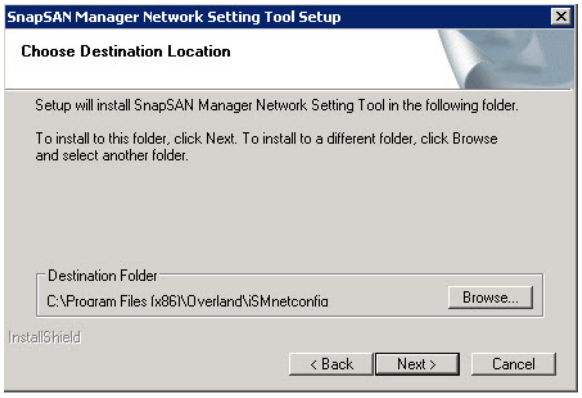
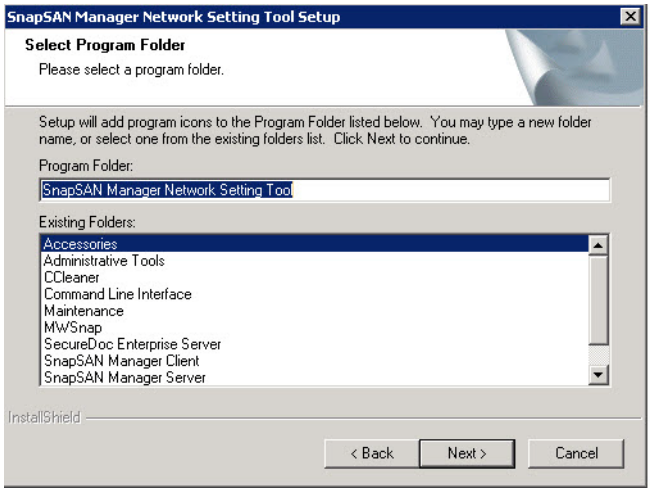
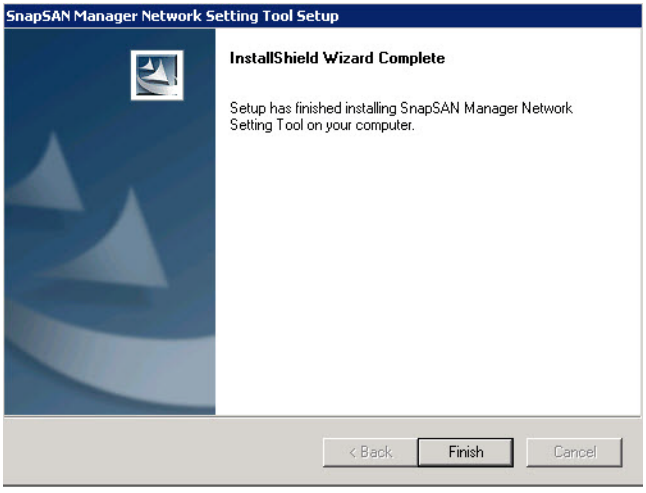
5. Click Next.


SnapSAN Manager Network Setting Tool Setup
Choose Destination Location
Setup will install SnapSAN Manager Network Setting Tool in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
C:\Program Files (x86)\Overland\iSMnetconfig
Browse...
InstallShield
< Back
Next >
Cancel

6. Click Next.


SnapSAN Manager Network Setting Tool Setup
Select Program Folder
Please select a program folder.
Setup will add program icons to the Program Folder listed below. You may type a new folder name, or select one from the existing folders list. Click Next to continue.
Program Folder:
SnapSAN Manager Network Setting Tool
Existing Folders:
Accessories
Administrative Tools
CCleaner
Command Line Interface
Maintenance
MWSnap
SecureDoc Enterprise Server
SnapSAN Manager Client
SnapSAN Manager Server
InstallShield
< Back
Next >
Cancel

7. Click Finish.


SnapSAN Manager Network Setting Tool Setup
InstallShield Wizard Complete
Setup has finished installing SnapSAN Manager Network Setting Tool on your computer.
< Back
Finish
Cancel

Configuring SnapSAN Manager Network Setting Tool

1. Click Network Setting Tool Icon.

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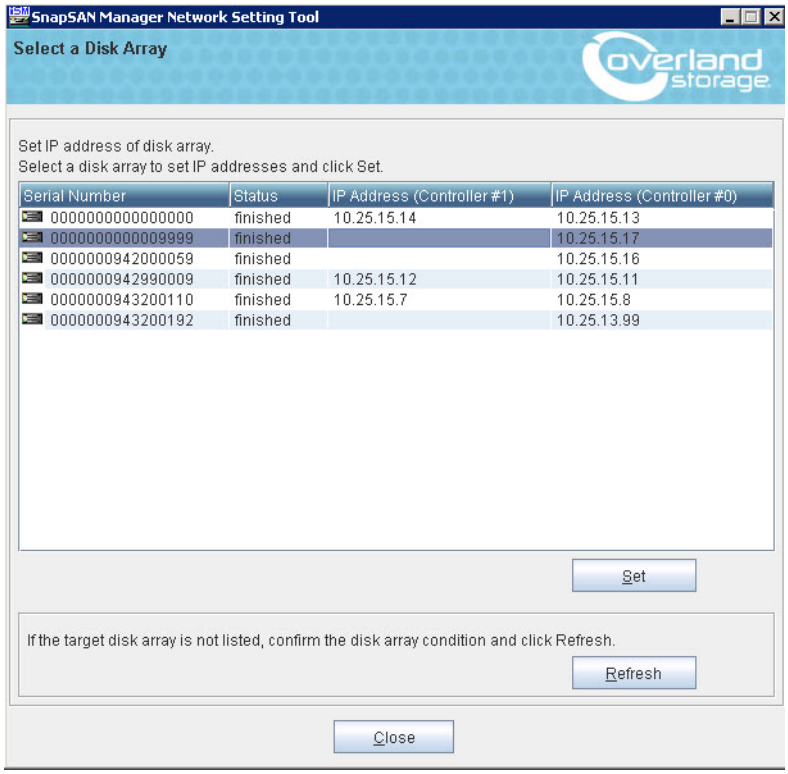
2. Click IP Address.


SnapSAN Manager Network Setting Tool
Select a Disk Array
overland storage
Set IP address of disk array.
Select a disk array to set IP addresses and click Set.
Serial Number
Status
IP Address (Controller #1)
IP Address (Controller #0)
0000000000000000 finished 10.25.15.14 10.25.15.13
0000000000009999 finished 10.25.15.17
0000000942000059 finished 10.25.15.16
0000000942990009 finished 10.25.15.12 10.25.15.11
0000000943200110 finished 10.25.15.7 10.25.15.8
0000000943200192 finished 10.25.13.99
Set
If the target disk array is not listed, confirm the disk array condition and click Refresh.
Refresh
Close

3. Click Set.

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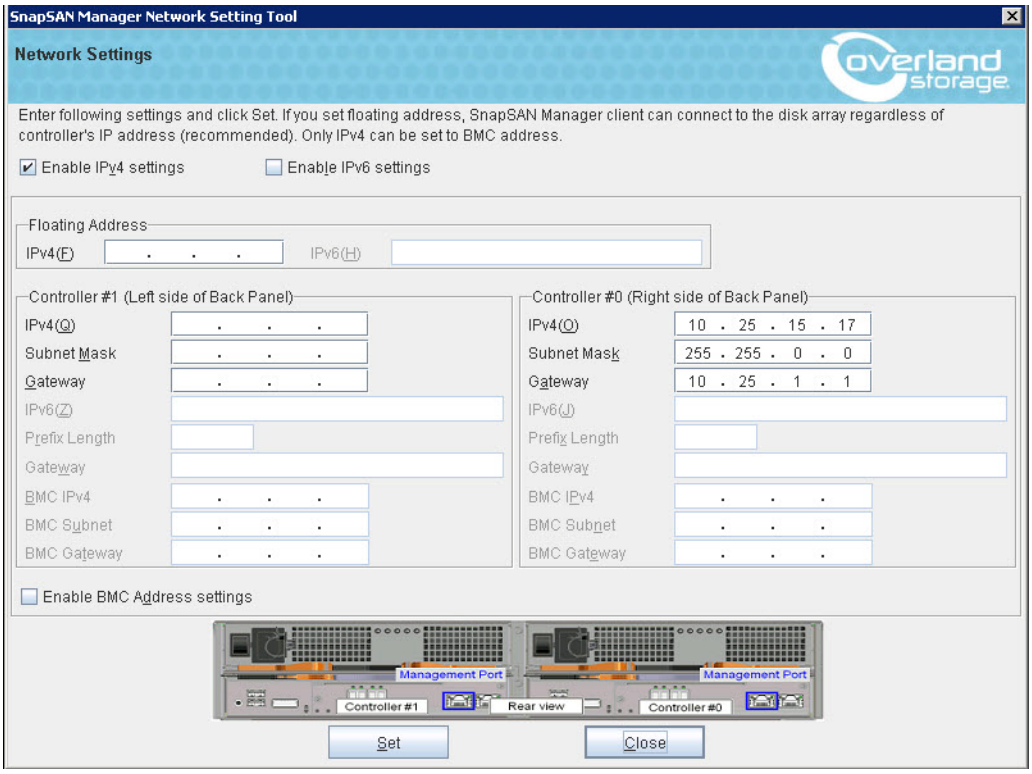
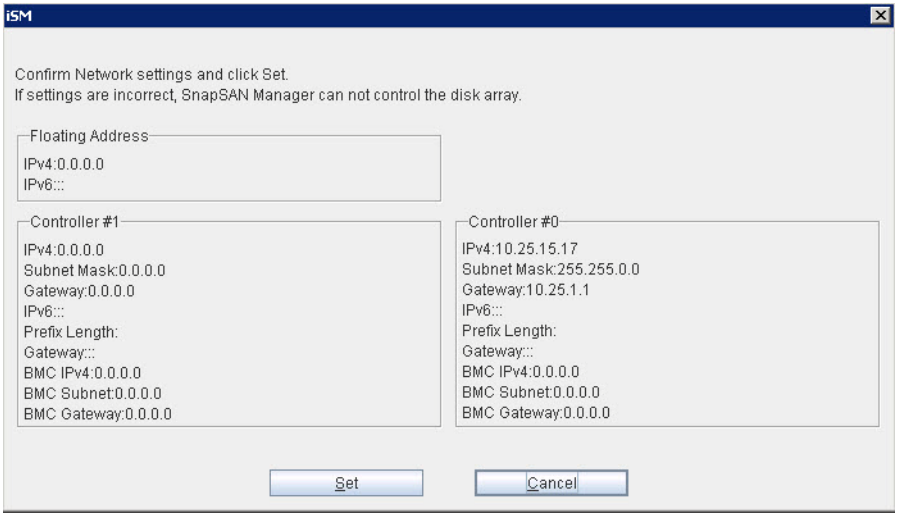
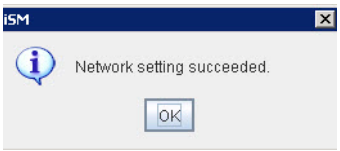


4. Click Set.



5. Click OK.



6. Click Close.

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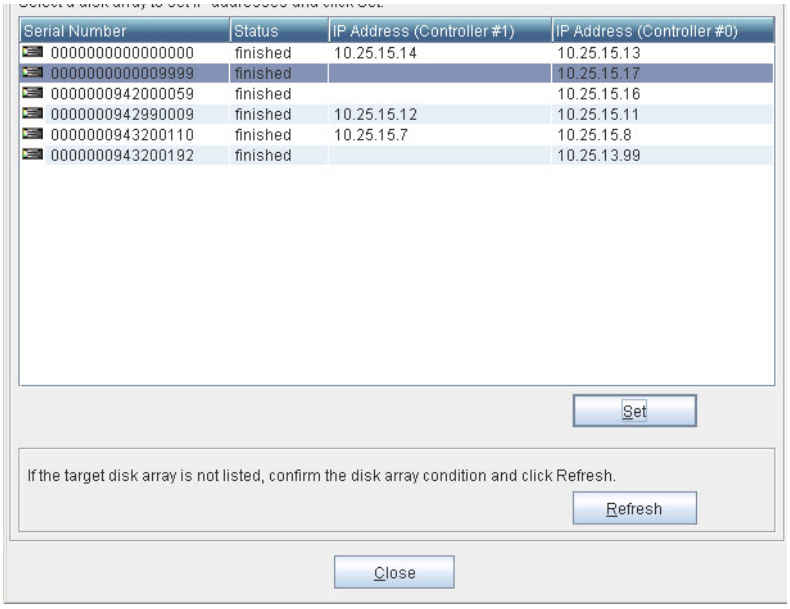
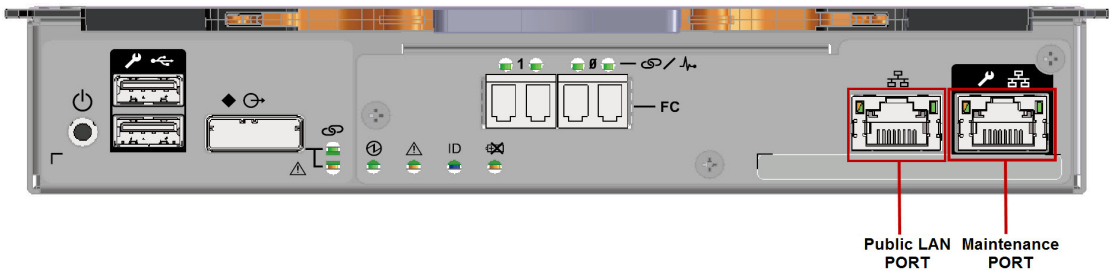


Option 1B Access the Embedded SnapSAN Manager through a Host

The other option is to access the Embedded SnapSAN Manager through a host system connected to the Maintenance Port on Controller 0.



1. Connect the LAN ethernet cables to the Public LAN port on controller 0 and to controller 1, if applicable.
2. Connect an ethernet cable from a host system to the Maintenance port.
3. Power unit on, if not already on.

To setup a computer that will be used to access the SnapSAN Manager Embedded through a browser:

4. Set local LAN IP of the Host to a subnet of 10.1.0.X and Network Mask of 255.255.255.0.
5. Launch a browser and insert 10.1.0.10 as a URL to connect to Controller 0 (to get to the SnapSAN Manager Embedded).
6. Enter IP Address10.1.0.10 in browser window.The installation options window opens.

Java JRE Installation

Follow the Java JRE installation instructions:

1. Click Install.

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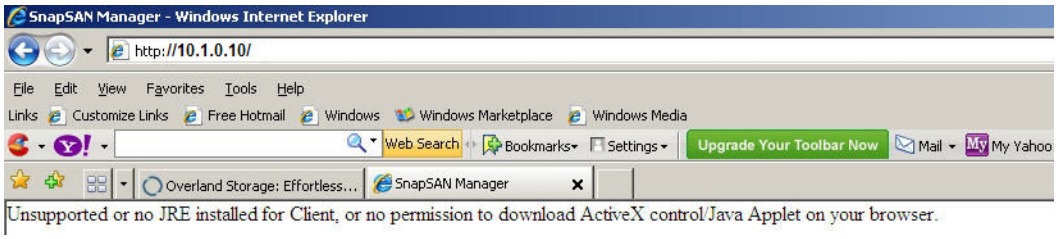
Internet Explorer - Security Warning
Do you want to install this software?
Name: Java(TM) SE Runtime Environment 6 Update 30
Publisher: Sun Microsystems, Inc.
More options
Install
Don't Install
While files from the Internet can be useful, this file type can potentially harm your computer. Only install software from publishers you trust. What's the risk?

Figure 3-2: Java Execute

Incorrect Java JRE Version

- If the incorrect Java JRE version is installed, click, Don't Install. The following window opens:


SnapSAN Manager - Windows Internet Explorer
http://10.1.0.10/
File Edit View Favorites Tools Help
Links Customize Links Free Hotmail Windows Windows Marketplace Windows Media
Web Search Bookmarks Settings Upgrade Your Toolbar Now Mail My Yahoo
Overland Storage: Effortless... SnapSAN Manager
Unsupported or no JRE installed for Client, or no permission to download ActiveX control/Java Applet on your browser.

a. Enter IP Address10.1.0.10 in browser window.The installation options window opens.

b. Repeat Step 1.

Java Installation

2. Click Install.

Java Setup - Welcome
java
ORACLE
Welcome to Java™
Java provides safe and secure access to the world of amazing Java content. From business solutions to helpful utilities and entertainment, Java makes your internet experience come to life.
Note: No personal information is gathered as part of our install process. Click here for more information on what we do collect.
Click Install to accept the license agreement and install Java now.
Change destination folder
Cancel
Install >

3. Click Close.

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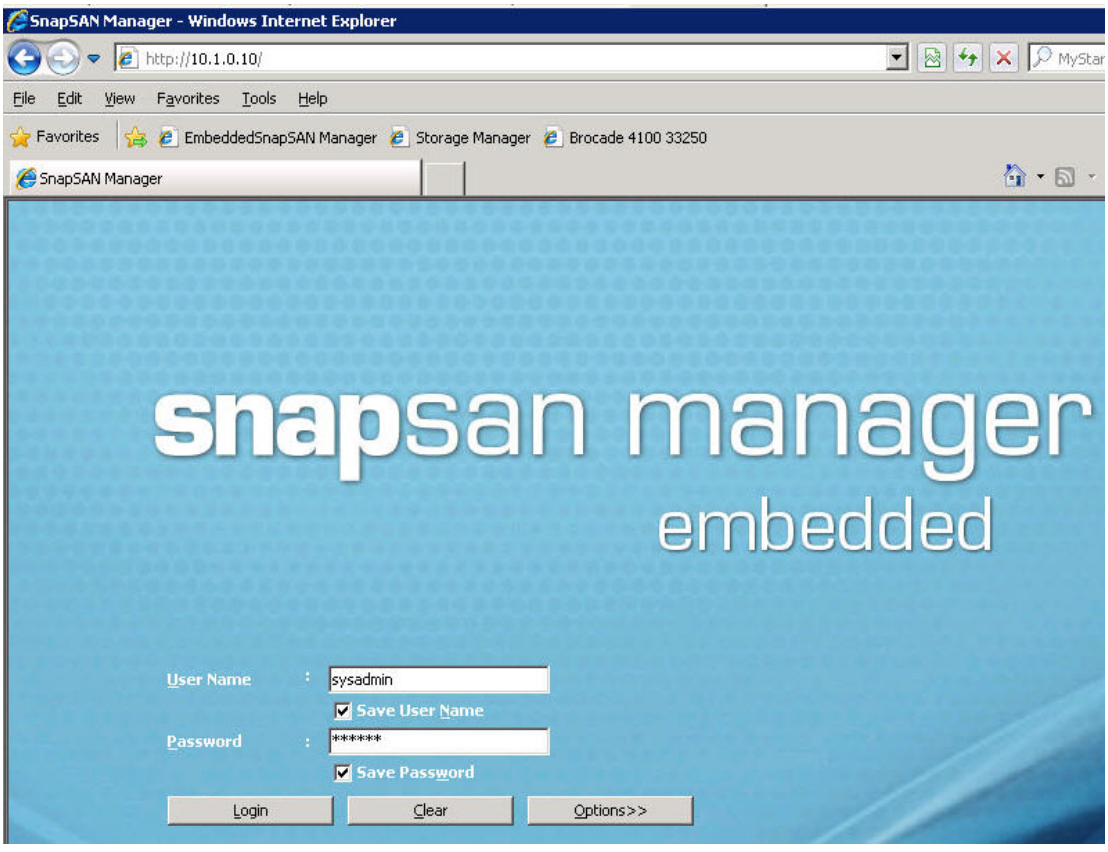
Java Setup - Complete
ORACLE
You have successfully installed Java
Java updates will automatically be downloaded to provide you with the latest features and security improvements.
To change this, see http://java.com/autoupdate
Close

4. Launch a browser and IP Address in order to get to the SnapSAN Manager Embedded
5. Login using sysadmin and password of sys123 in the SnapSAN Manager Embedded, and check Save Password checkbox.



Information is acquired to start the initialization wizard.

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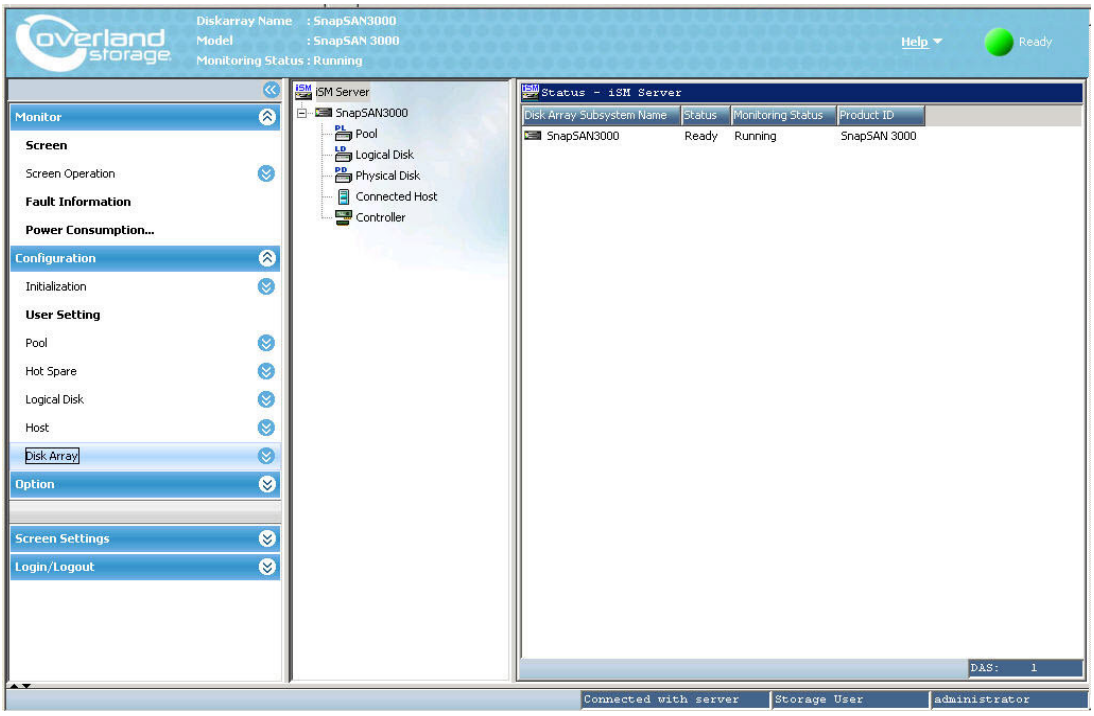
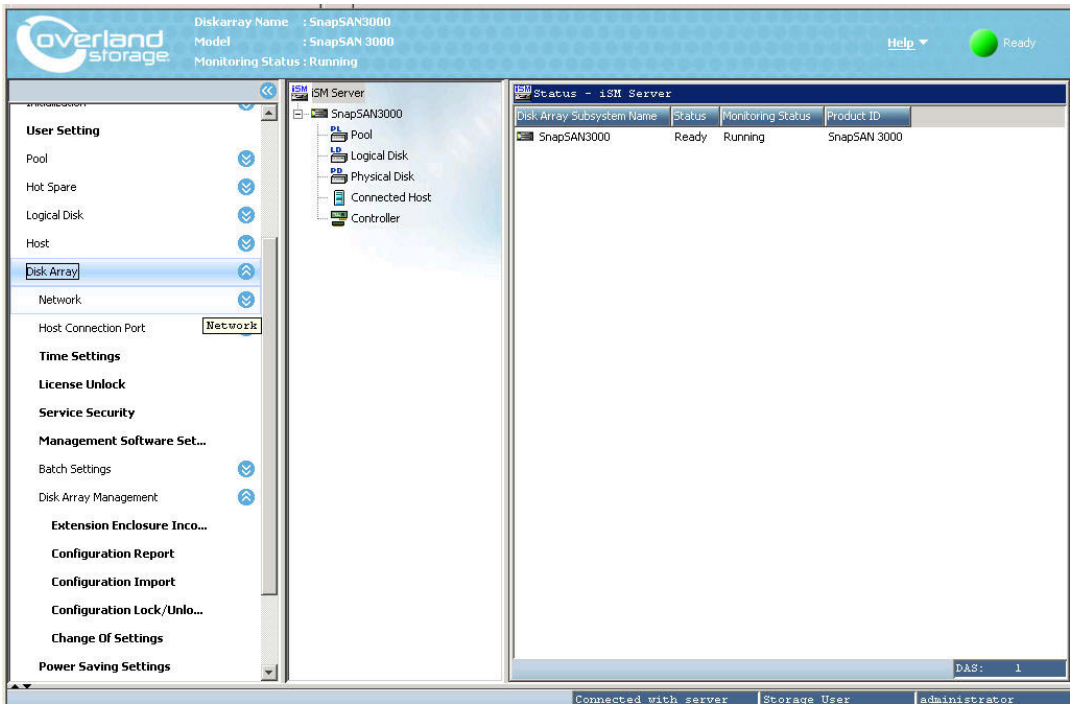
Network Configuration

1. Select Disk Array from the menu bar.



2. Select Network.



3. Select Management Port Settings.

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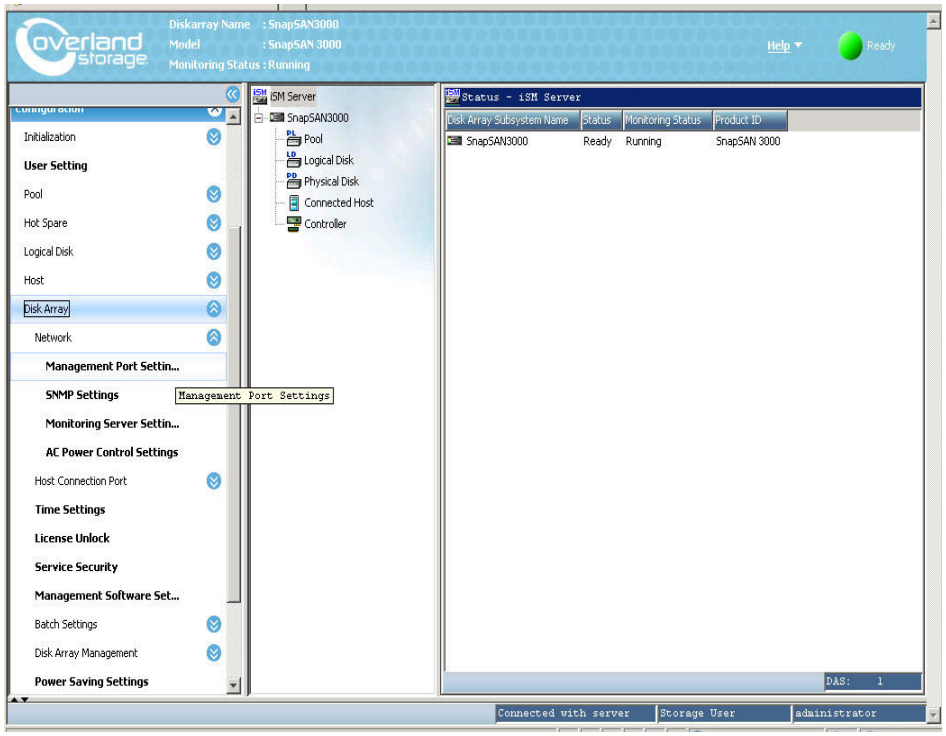
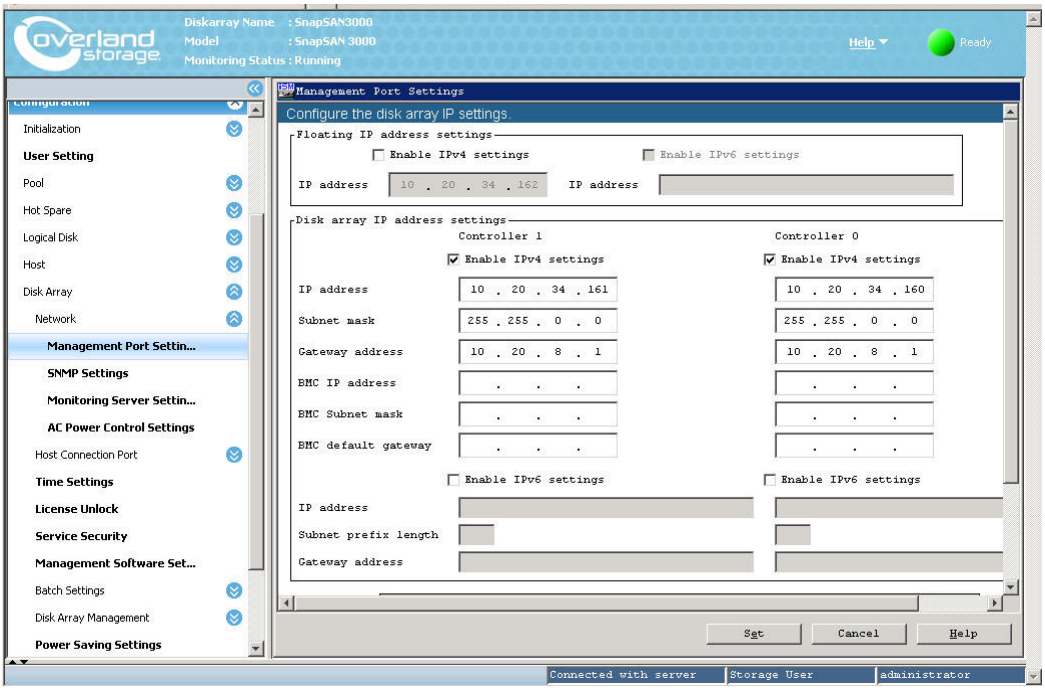


4. Click Set.



5. Click Yes.

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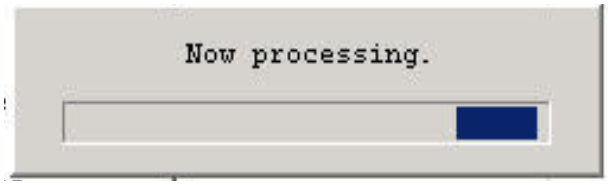
[25687]
Set the network information of the Disk Array.
If the setup fails, you may not be able to recognize the Disk Array.
Do you want to continue?
Yes
No
Help

6. Click No.

The meter shows the status. You'll be routed back to SnapSAN Manager server.



SnapSAN Manager Server Installation and Configuration

After configuring the SnapSAN Array public network configuration either by: "Option 1A Install and Configure the Network Setting Tool on SSMS Server" or "Option 1B Access the Embedded SnapSAN Manager through a Host" as previously outlined, you can now install the SnapSAN Manager Server. To do so, run the executable that you had in your image "iSMserver_setup.exe".

1. Click iSMServer_setup.

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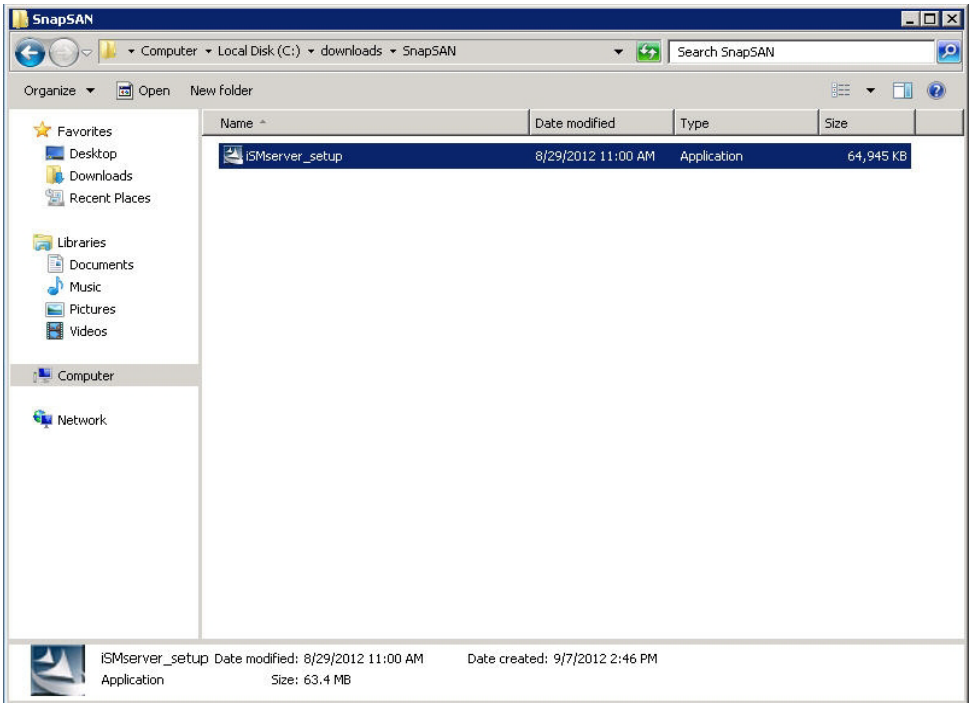
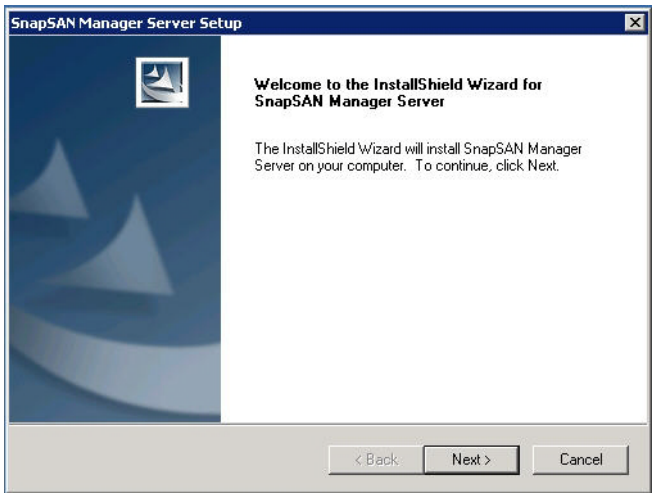


2. Click Next.


SnapSAN Manager Server Setup
Welcome to the InstallShield Wizard for SnapSAN Manager Server
The InstallShield Wizard will install SnapSAN Manager Server on your computer. To continue, click Next.
< Back
Next >
Cancel

3. Read **Software License Agreement**.
   - If you **accept** the agreement select I accept terms of the license agreement and then click **Next**.

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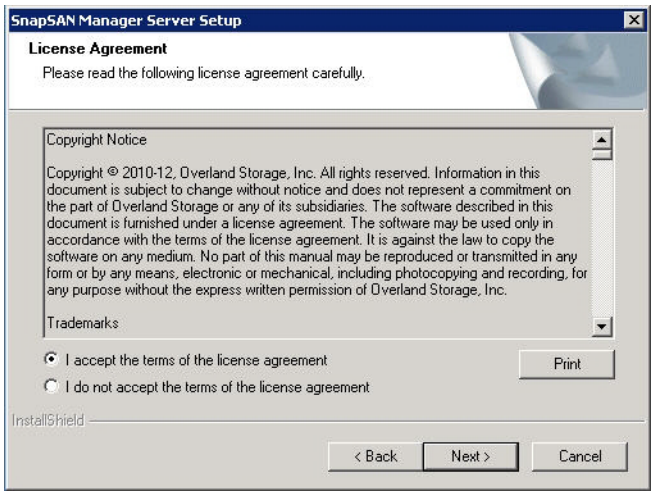
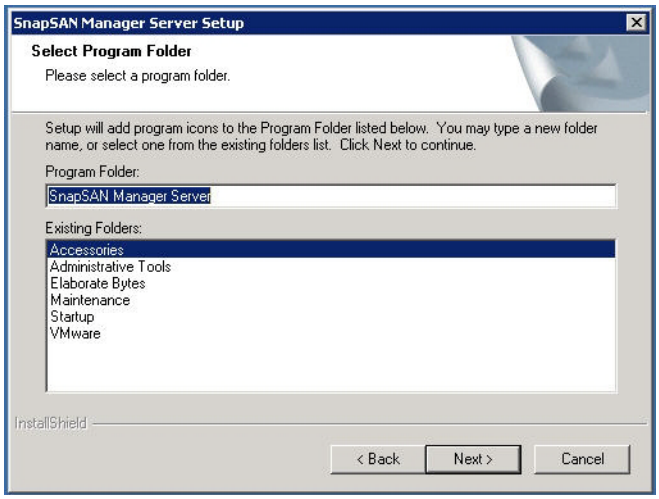
- If you **do not accept** the agreement, you cannot use the software.


SnapSAN Manager Server Setup
License Agreement
Please read the following license agreement carefully.
Copyright Notice
Copyright © 2010-12, Overland Storage, Inc. All rights reserved. Information in this document is subject to change without notice and does not represent a commitment on the part of Overland Storage or any of its subsidiaries. The software described in this document is furnished under a license agreement. The software may be used only in accordance with the terms of the license agreement. It is against the law to copy the software on any medium. No part of this manual may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, for any purpose without the express written permission of Overland Storage, Inc.
Trademarks
I accept the terms of the license agreement
I do not accept the terms of the license agreement
Print
InstallShield
< Back
Next >
Cancel

4. To install the software in the shown destination, click **Next**.

   If you want to install the software in a folder other than the shown destination, click Browse to select the folder you want to use.

5. Click Next. A default group called SnapSAN Manager Server will be created.



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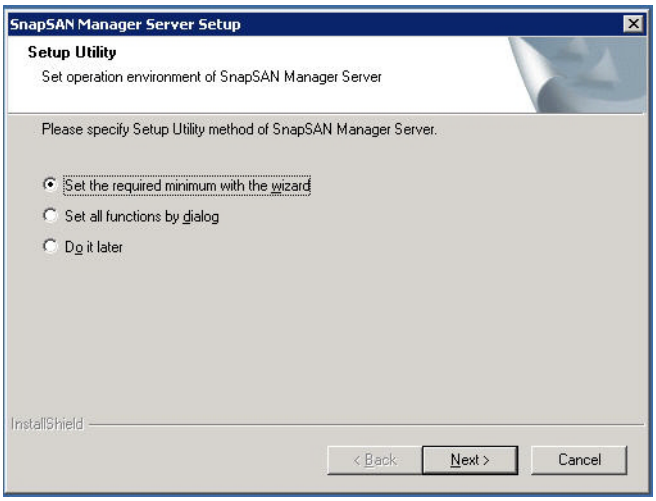
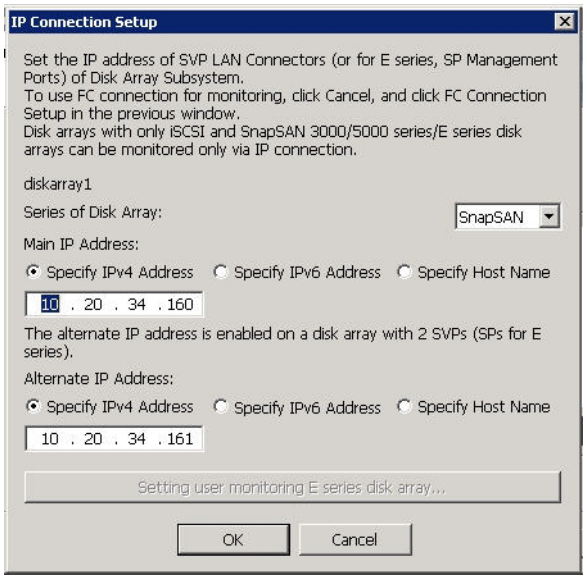
Start Setup Utility

1. Select Set the required minimum with the wizard and, click Next.


SnapSAN Manager Server Setup
Setup Utility
Set operation environment of SnapSAN Manager Server
Please specify Setup Utility method of SnapSAN Manager Server.
Set the required minimum with the wizard
Set all functions by dialog
Do it later
InstallShield
< Back
Next >
Cancel

2. Select SnapSAN from the drop-down menu, enter the IP address, and click OK.


IP Connection Setup
Set the IP address of SVP LAN Connectors (or for E series, SP Management Ports) of Disk Array Subsystem.
To use FC connection for monitoring, click Cancel, and click FC Connection Setup in the previous window.
Disk arrays with only iSCSI and SnapSAN 3000/5000 series/E series disk arrays can be monitored only via IP connection.
diskarray1
Series of Disk Array:
SnapSAN
Main IP Address:
Specify IPv4 Address
Specify IPv6 Address
Specify Host Name
10 . 20 . 34 . 160
The alternate IP address is enabled on a disk array with 2 SVPs (SPs for E series).
Alternate IP Address:
Specify IPv4 Address
Specify IPv6 Address
Specify Host Name
10 . 20 . 34 . 161
Setting user monitoring E series disk array...
OK
Cancel

3. Click Next.

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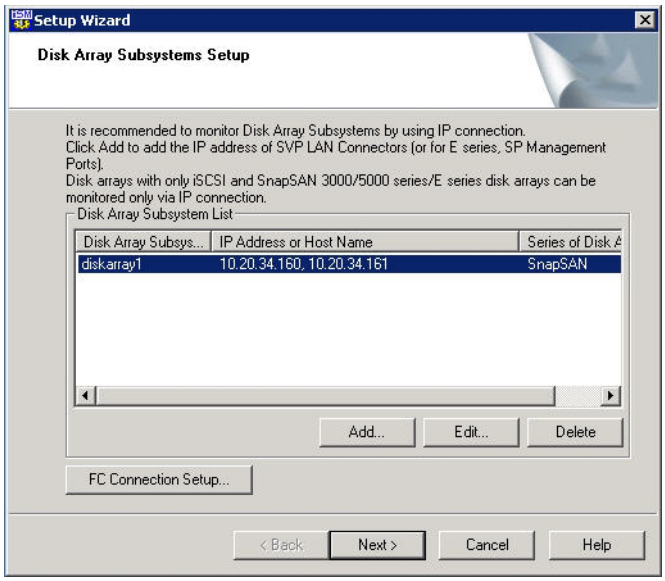
Setup Wizard
Disk Array Subsystems Setup
It is recommended to monitor Disk Array Subsystems by using IP connection.
Click Add to add the IP address of SVP LAN Connectors (or for E series, SP Management Ports).
Disk arrays with only iSCSI and SnapSAN 3000/5000 series/E series disk arrays can be monitored only via IP connection.
Disk Array Subsystem List
Disk Array Subsys...
IP Address or Host Name
Series of Disk A
diskarray1
10.20.34.160, 10.20.34.161
SnapSAN
Add...
Edit...
Delete
FC Connection Setup...
< Back
Next >
Cancel
Help

Create Administrator and Users

1. Create the user name and password for the administrator.

2. Click OK.

3. Define the authorized users.

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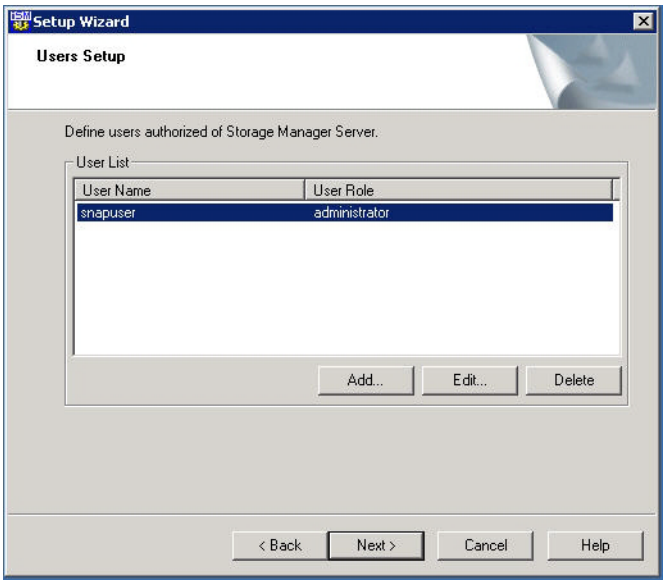
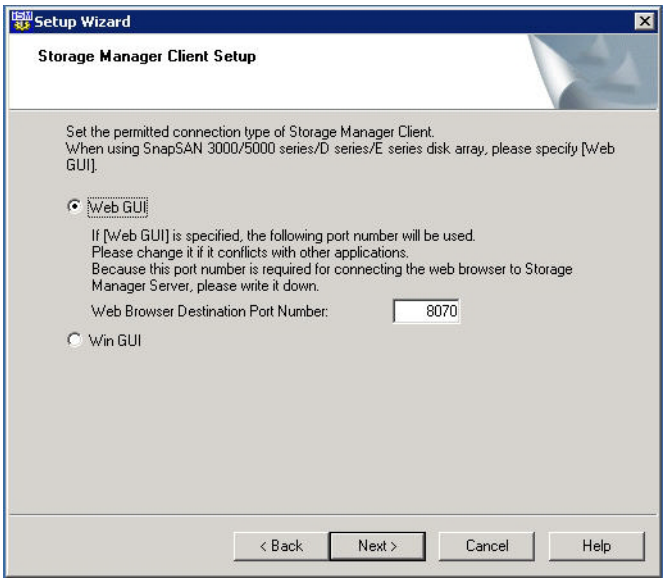


Connection Settings

4. Set the permitted connection type.


Setup Wizard
Storage Manager Client Setup
Set the permitted connection type of Storage Manager Client.
When using SnapSAN 3000/5000 series/D series/E series disk array, please specify [Web GUI].
Web GUI
If [Web GUI] is specified, the following port number will be used.
Please change it if it conflicts with other applications.
Because this port number is required for connecting the web browser to Storage Manager Server, please write it down.
Web Browser Destination Port Number:
8070
Win GUI
< Back
Next >
Cancel
Help

5. Select the log output file.

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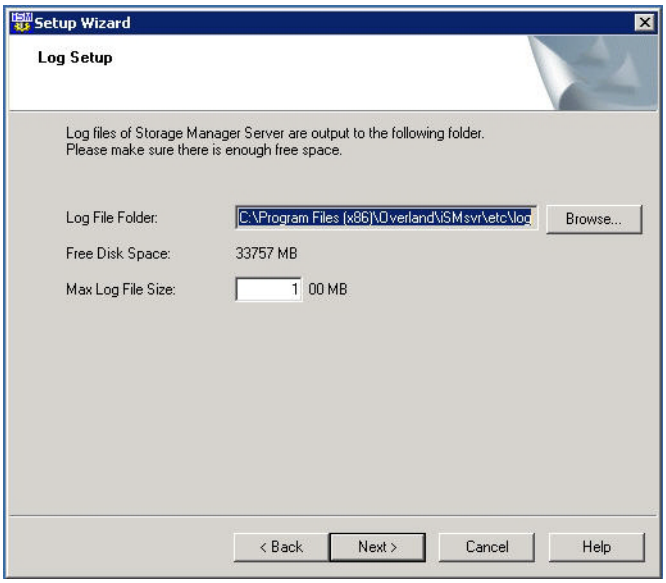
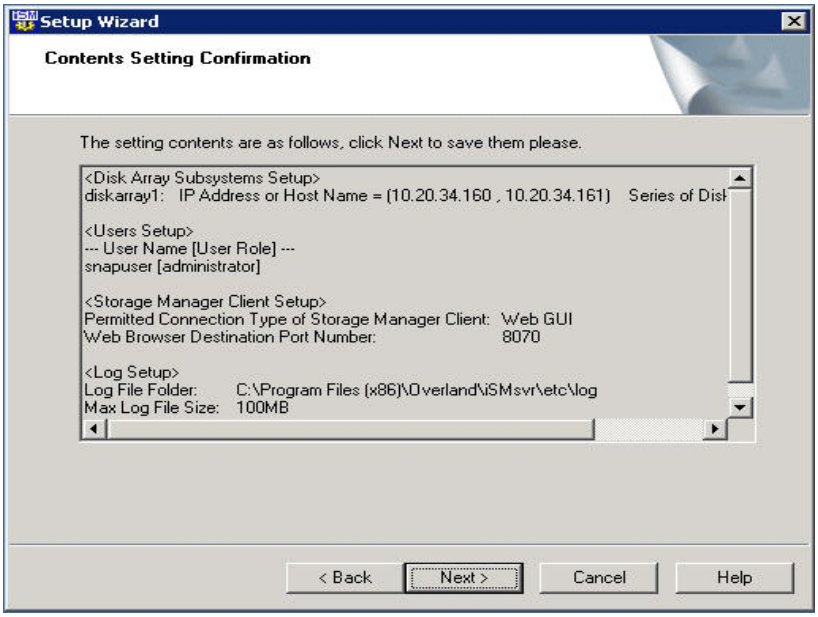
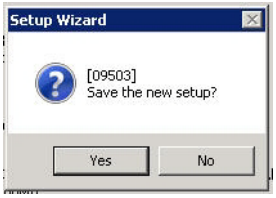


6. Click Next to confirm save.



7. Click Yes to save settings.



8. Click Finish to exit Setup Wizard.

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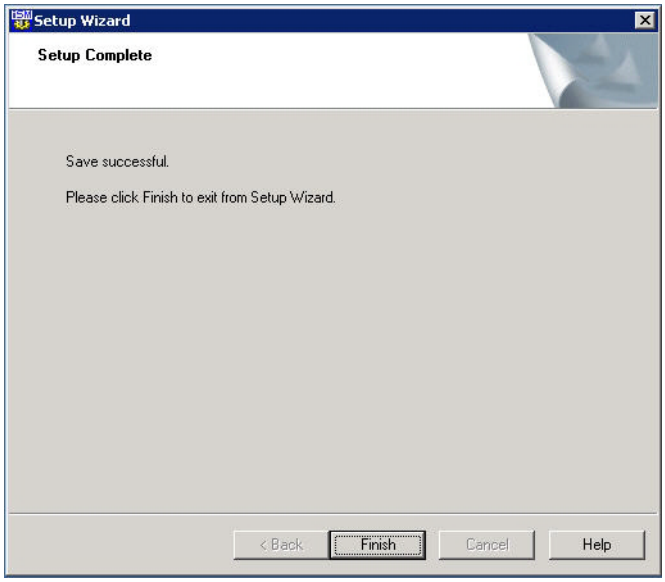
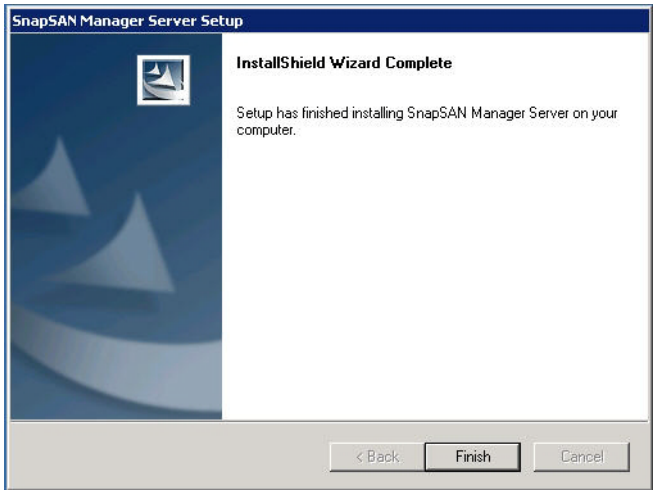
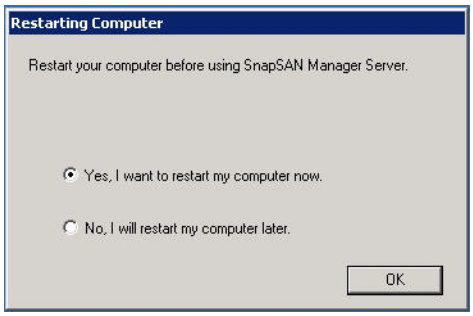


9. Click Finish again. The installation of SnapSAN Manger is complete.



10. Select restart option.


Restarting Computer
Restart your computer before using SnapSAN Manager Server.
Yes, I want to restart my computer now.
No, I will restart my computer later.
OK

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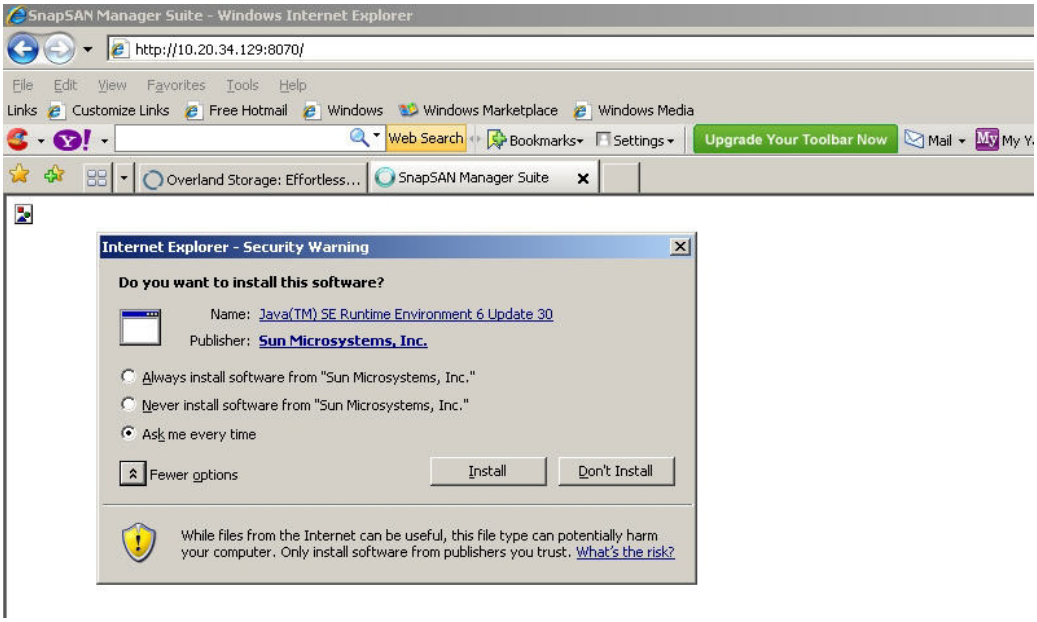
Open SnapSAN Manager Server

1. Enter IP Address of the configured SnapSAN Manager Server using port **8070** in browser window.The installation options window opens.

You have two Java JRE installation options:

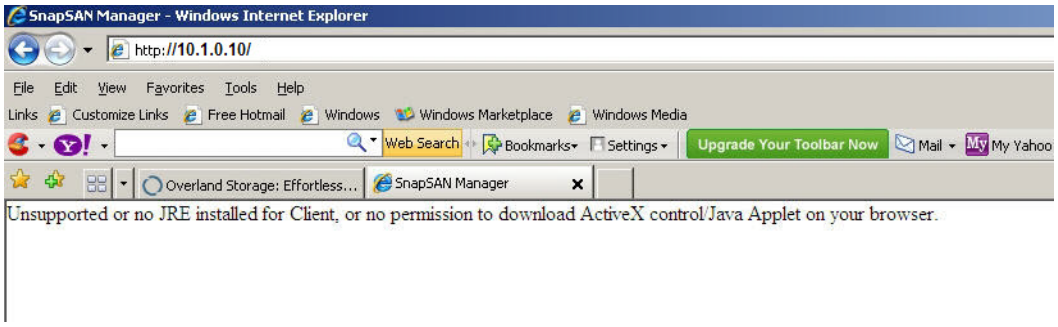
Option 1

2. Click Install. Proceed to Step 5.


SnapSAN Manager Suite - Windows Internet Explorer
http://10.20.34.129:8070/
File Edit View Favorites Tools Help
Links Customize Links Free Hotmail Windows Windows Marketplace Windows Media
Web Search Bookmarks Settings Upgrade Your Toolbar Now Mail
Overland Storage: Effortless...
SnapSAN Manager Suite
Internet Explorer - Security Warning
Do you want to install this software?
Name: Java(TM) SE Runtime Environment 6 Update 30
Publisher: Sun Microsystems, Inc.
Always install software from "Sun Microsystems, Inc."
Never install software from "Sun Microsystems, Inc."
Ask me every time
Fewer options
Install
Don't Install
While files from the Internet can be useful, this file type can potentially harm your computer. Only install software from publishers you trust. What's the risk?

Option 2

3. If JRE is not installed or is the incorrect version is installed, click, Don't Install. The following window opens:


SnapSAN Manager - Windows Internet Explorer
http://10.1.0.10/
File Edit View Favorites Tools Help
Links Customize Links Free Hotmail Windows Windows Marketplace Windows Media
Web Search Bookmarks Settings Upgrade Your Toolbar Now Mail
Overland Storage: Effortless...
SnapSAN Manager
Unsupported or no JRE installed for Client, or no permission to download ActiveX control/Java Applet on your browser.

4. Repeat Step 1 - Step 2.

Java Installation

5. Click Install.

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Java Setup - Welcome
ORACLE
Welcome to Java™
Java provides safe and secure access to the world of amazing Java content. From business solutions to helpful utilities and entertainment, Java makes your internet experience come to life.
Note: No personal information is gathered as part of our install process.
Click here for more information on what we do collect.
Click Install to accept the license agreement and install Java now.
Change destination folder
Cancel
Install >

6. Click Close.

Java Setup - Complete
ORACLE
You have successfully installed Java
Java updates will automatically be downloaded to provide you with the latest features and security improvements.
To change this, see http://java.com/autoupdate
Close

Client opens.

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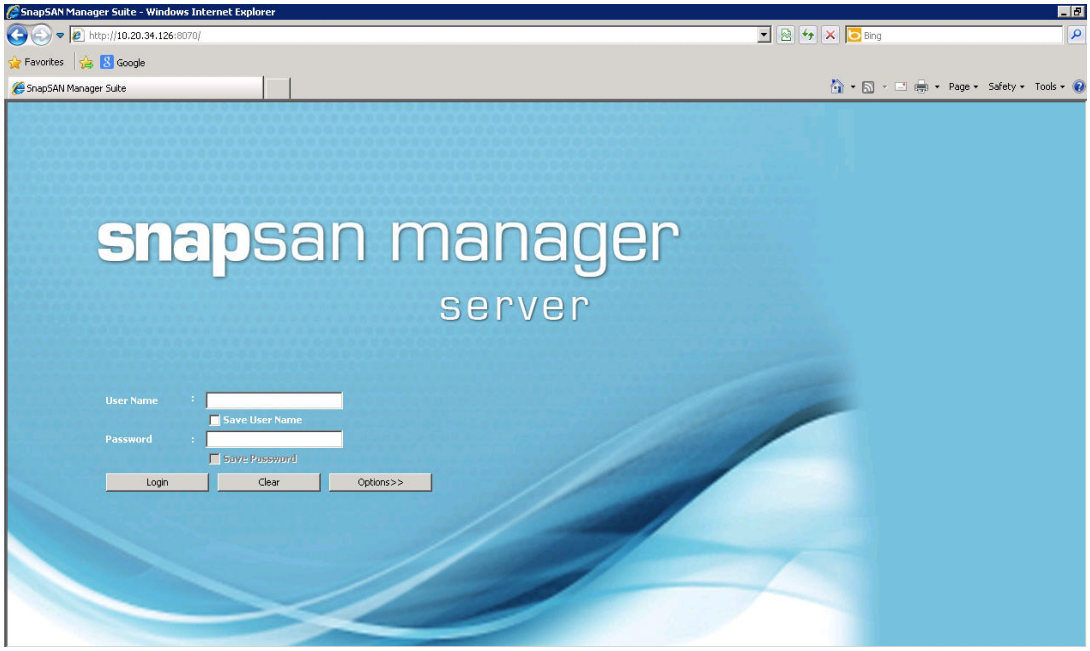
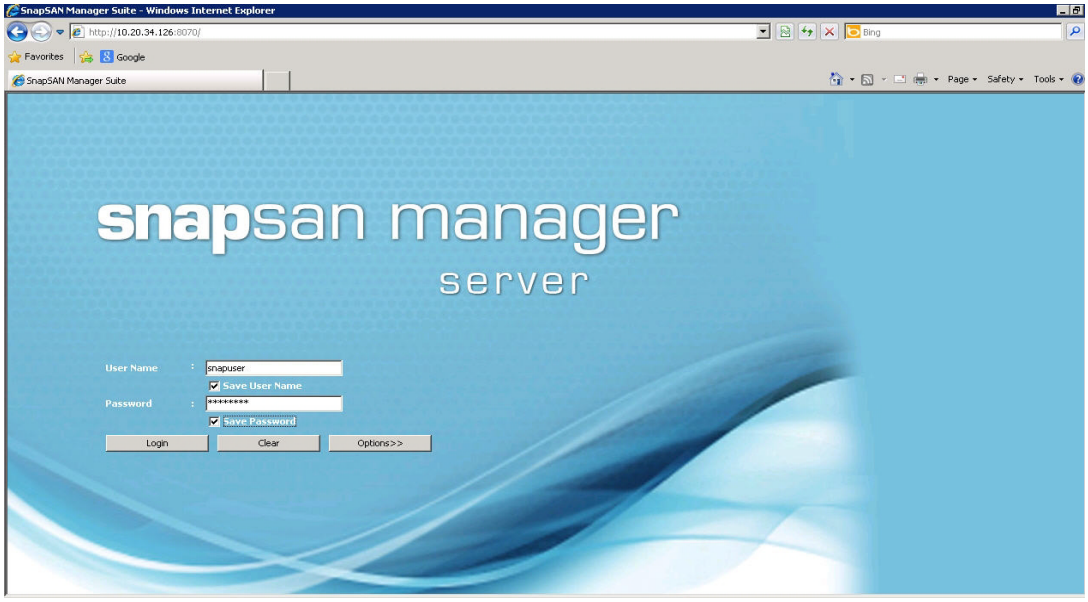
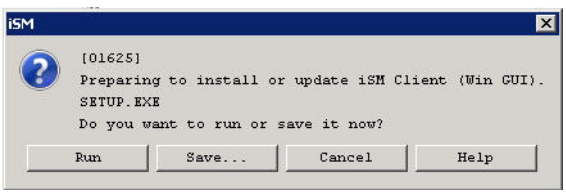


7. Enter User Name, Password, and check Save Password checkbox.



8. Click Run.



InstallShield Wizard appears.

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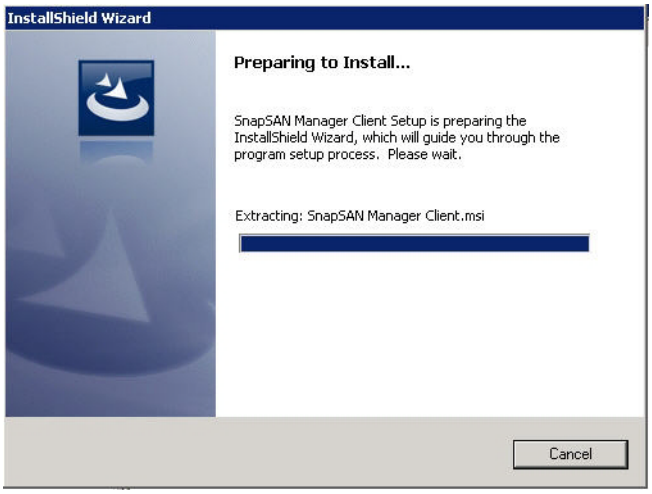
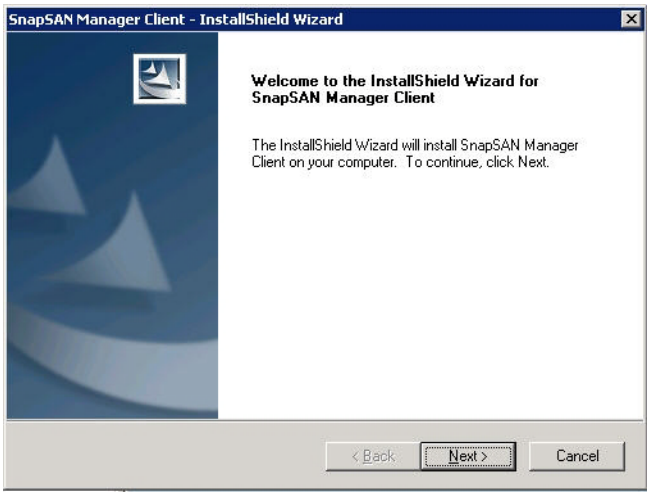

InstallShield Wizard
Preparing to Install...
SnapSAN Manager Client Setup is preparing the InstallShield Wizard, which will guide you through the program setup process. Please wait.
Extracting: SnapSAN Manager Client.msi
Cancel

9. Click Next.


SnapSAN Manager Client - InstallShield Wizard
Welcome to the InstallShield Wizard for SnapSAN Manager Client
The InstallShield Wizard will install SnapSAN Manager Client on your computer. To continue, click Next.
< Back
Next >
Cancel

10. Read **Software License Agreement**.

- If you **accept** the agreement select I accept terms of the license agreement and then click **Next**. Proceed to step 8.
- If you **do not accept** the agreement, you cannot use the software.

11. Read Readme files and click, Next.

12. To install to the destination folder click Next. To install to a different folder, click Browse and select another folder.

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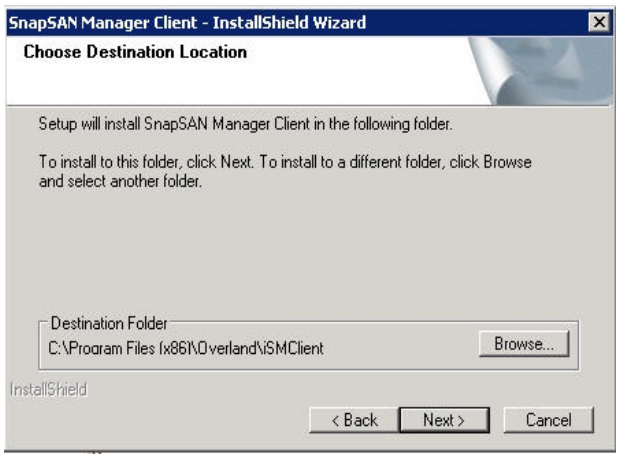
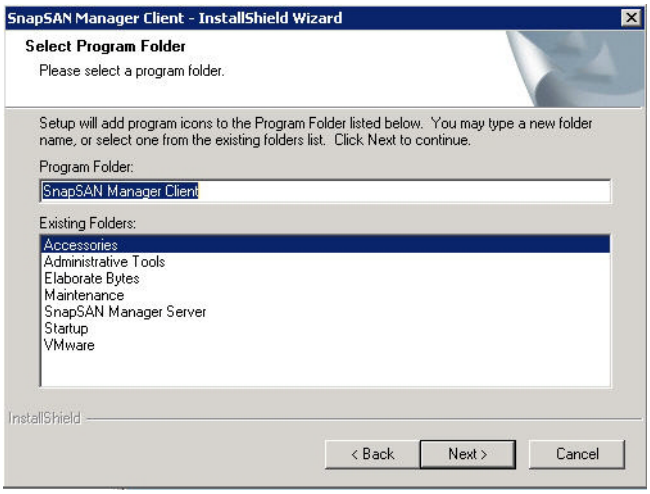
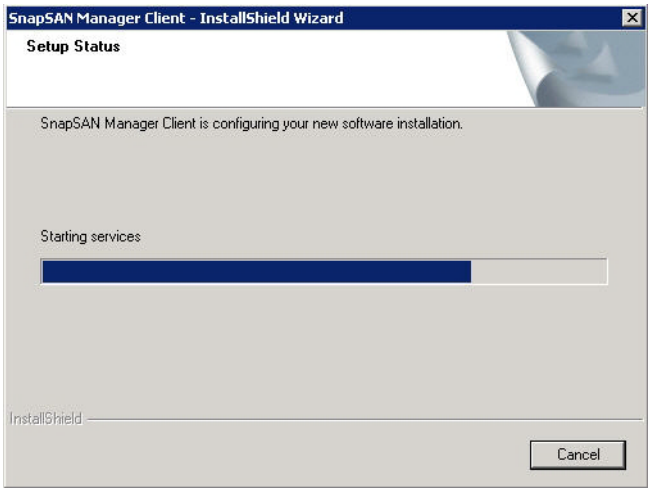

SnapSAN Manager Client - InstallShield Wizard
Choose Destination Location
Setup will install SnapSAN Manager Client in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
C:\Program Files (x86)\Overland\iSMClient
Browse...
InstallShield
< Back
Next >
Cancel

13. Select a program folder and click Next.


SnapSAN Manager Client - InstallShield Wizard
Select Program Folder
Please select a program folder.
Setup will add program icons to the Program Folder listed below. You may type a new folder name, or select one from the existing folders list. Click Next to continue.
Program Folder:
SnapSAN Manager Client
Existing Folders:
Accessories
Administrative Tools
Elaborate Bytes
Maintenance
SnapSAN Manager Server
Startup
VMware
InstallShield
< Back
Next >
Cancel

SnapSAN Manager Client configures software installation.



14. Click Finish. The SnapSAN Manager Monitor Screen appears.

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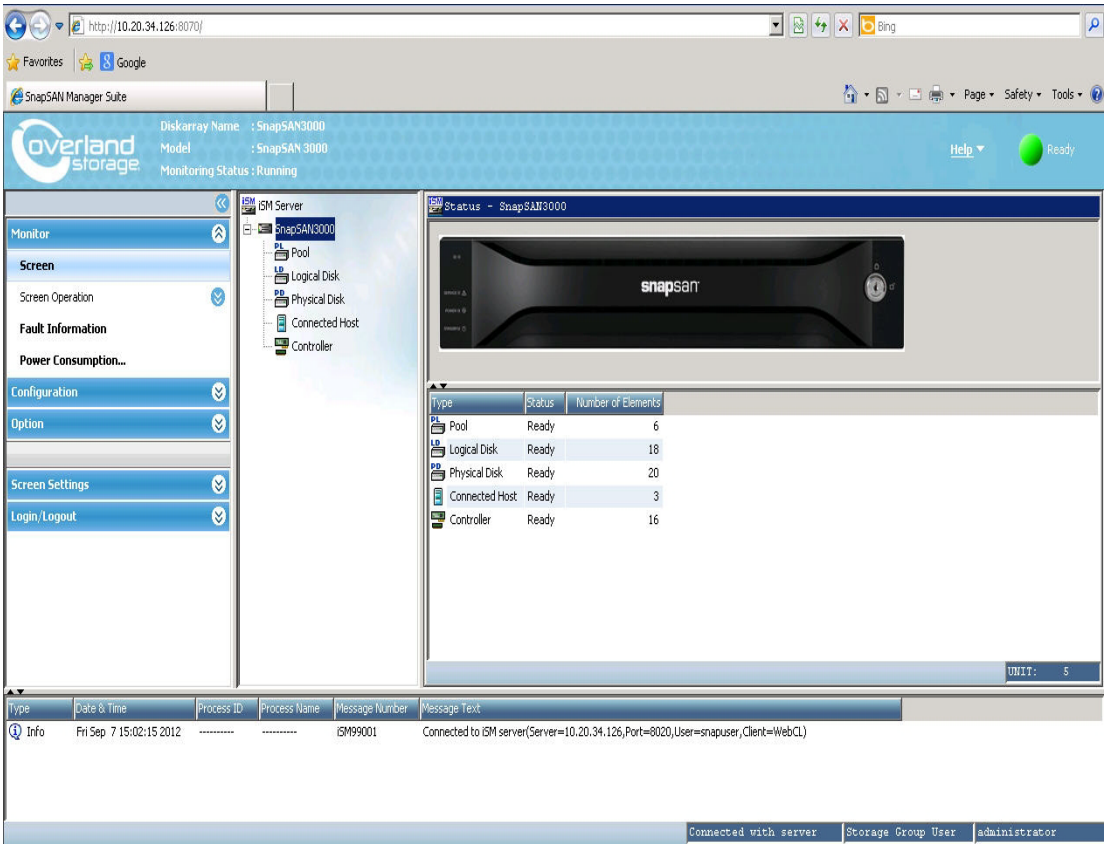

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Chapter 4

Initializing a FC, iSCSI, and SAS Disk Array

Overview

This chapter describes how to initialize a disk array configured for FC, iSCSI, and SAS connections.

The initialization consists of:

1. **Collecting host information**
   - Collect host information from the application server.
   - For details about the procedure, see "Collecting Host Information".
2. **Initializing the disk array by using the initialization wizard**
   - Use the initialization wizard to make the basic settings of the disk array.
   - For details about the procedure, see "Initialization by SnapSAN Manager Initialization Wizard".
3. **Binding a pool**
   - Bind a pool in the disk array.
   - For details about the procedure, see *""Binding a Pool""*.
4. **Binding a hot spare**
   - Bind a hot spare. This step is not required unless a hot spare is bound.
   - For details about the procedure, see *""Binding a Hot Spare"e"*.
5. **Binding logical disks**
   - Bind logical disks.
   - For details about the procedure, see *""Binding Logical Disks""*.
6. **Collection and registration of host information**
   - Collect host information and register it with the disk array.
   - For details about the procedure, see *""Collecting Host Information"*
7. **Assigning the logical disks to the application servers**
   - Assign the created logical disk to the application servers.
   - For details about the procedure, see *""Assignment of Logical Disks"s"*.
8. **Checking connection from the application servers**
   - Check that the application server to which the logical disks have been assigned can access the disk array.
   - For details about the procedure, see *""Checking Connection from Application Servers""*.

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Collecting Host Information

This section describes collection of host information from application servers.

Host information can be automatically collected if the OS used on the application servers is only Windows and servers used in the system are all new (servers that have not begun operating).

When there is any Linux (RHEL5 or later or SLES10 or later) application server and the servers used in the system are all new (servers that have not begun operating), host information can be collected through the disk array.

To collect host information when the disk array is installed in a system that has already begun operating or there is any application server on a different operating system, see "Collecting Host Information by Using File Output - Windows."or "Collecting/Registering Host Information on Application Server - Linux."

Collecting Host Information Automatically or through a Disk Array - Windows

When the OS of new servers to be connected by SAS cables is Windows and a disk array is newly installed, host information can be automatically collected by using the SnapSAN Manager Host Agent Service function and SAS connection paths between the disk array and Windows servers.

When the OS of new servers to be connected by FC, iSCSI, and SAS cables is Linux (RHEL5 or later or SLES10 or later) and a disk array is newly installed, host information can be collected through the disk array.

To collect host information without connecting FC, iSCSI, and SAS cables in one of the configurations above, see "Collecting Host Information by Using File Output - Windows."or "Collecting/Registering Host Information on Application Server - Linux."

Collecting Host Information by using the Host Information Collection Command

When a disk array is installed in a system that has already begun operating or any of the application servers to be connected by FC, iSCSI, and SAS cables is on an OS other than Windows or Linux (RHEL5 or later or SLES10 or later), use the host information collection command to report files. Registering the reported files allows assigning the application server to created logical disks. For details about how to register reported files, see "Collecting Host Information by Using File Output - Windows."or "Collecting/Registering Host Information on Application Server - Linux."

- To make settings for collecting host information automatically or through a disk array, see *""Collecting Host Information"*.
- For details about how to collect host information, see one of the following depending on the platform of the application server:
  - For a Windows application server, see "Collecting/Registering Host Information on Application Server - Windows".
  - For a Linux application server, see "Collecting/Registering Host Information on Application Server - Linux."

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Initialization by SnapSAN Manager Initialization Wizard

Overview

Use the initialization wizard to make the basic settings of a disk array.

Operations to be performed on the initialization wizard are:

- Set the disk array subsystem name
- Change and/or confirm a disk array name.
- Set time
- Set time by configuring the NTP server, or manually.
- Host connection port parameters (FC, iSCSI, and SAS)
- Set the host connection port.
- Port mode switching
- Change the port mode.

Starting the Initialization Wizard

1. Click **Configuration** and **Initialization** on the left pane to open the menu.
2. Then click **Start** to start the initialization wizard.

Before the initialization starts, the following confirmation message appears.

3. Click **Yes** to start the initialization wizard.

When the initialization wizard starts, perform the settings as prompted.

4. Select the setting type for initialization.
   The sections below explain how to make normal setting.

IMPORTANT: To perform quick setting, see *Configuration Setting Tool User's Manual (GUI) for the SnapSAN S3000/S5000*.

5. Confirm whether Normal Setting is selected, and then click **Next**.

NOTE: Quick Setting cannot be used: for the disk arrays of the SnapSAN 5000 or later; when Access Control is enabled and; if unused physical disk are different in type, capacity or rotation speed.

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Set Disk Array Subsystem Name

You can change the disk array name.

Parameter	Description
Product ID	Displays the product ID of the disk array.
Serial Number	Displays the serial number of the disk array.
Disk Array Subsystem Name	Displays a name to identify the disk array subsystem.
New Disk Array Subsystem Name	By default, displays the current disk array subsystem name. To change this name, enter a new disk array subsystem name.

Perform the following steps to change a disk array name:

1. Enter a new name in the **New Disk Array Subsystem Name** box.
2. Confirm the name and click **Next**.

Set Time

Figure 4-1:

Parameter	Description
State	Displays the date and time currently set for the disk array and the status of synchronization with the NTP server appear.
Synchronize the time with the NTP server.	Select this option to move on to the NTP setting page.
Set the time manually.	Select this option to move on to the manual time setting page.
Don't set the time now.	Select this option to move on to the step to unlock license without setting time.

To configure a time using NTP, select **Synchronize the time with the NTP server** and click **Next**.

3. Configure the NTP settings.

Parameter	Description
IP Address	Specify an IP address of the NTP server.

4. To set NTP server, enter the required information and click **Next**.

Host Connection Port Parameters

Set the host connection port for the disk array supporting FC, iSCSI, and SAS.

This screen is displayed only for disk arrays of the SnapSAN 5000 or later.

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Parameter	Description
Port list	Select the port you want to set.
Edit button	A dialog box is displayed that lets you edit the settings of the selected port.

5. Edit dialog

Parameter	Description
Port number	Unique port number.
Port name	Specify the name to be assigned to the port.
Platform	Specify the platform of the host to be connected.
Data rate	Specify the value corresponding to the data transfer rate of the HBA or HUB.
Server connection type	Specify the connection topology between the disk array and the host. Automatic negotiation: The connection type is automatically negotiated. FC, iSCSI, and SAS-AL: Select this when connecting the host connection port and the application server directly over an cable or when using a loop topology FC, iSCSI, and SAS switch. FC, iSCSI, and SAS switch connection (Fabric): Select this when using an FC, iSCSI, and SAS switch other than a loop topology FC, iSCSI, and SAS switch.
Switch ID	Specify the value of the switch for the port. The specifiable value range is 00h to 7dh. When connecting multiple disk arrays in a loop topology FC, iSCSI, and SAS switch configuration, make sure that the value of each switch is unique.
Port type	Select the port type. Select the host port or data migration port. This setting is displayed only when the data migration function is usable.

6. Clicking **OK** applies the change of settings to the list.
7. When you click **Next** after changing the port settings as needed, the port settings are made.

PORT Selection -iSCSI

1. Select a port from the host connection port list and click **Edit**. The dialog box for editing the settings of the selected port appears.

   a. When editing the settings of host connection ports is completed, click **Next** on the Host connection port parameters (iSCSI) page.

   b. To change the settings for another port, select the port to edit from the host connection port list and click **Edit**.

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Parameter	Description
Port number	Displays unique number for the port.
Port name	Specify a port name.
Link Speed & Duplex	Displays the value of the link speed duplex. These values cannot be changed.
MTU	Select a MTU (Maximum Transmission Unit) size from the drop-down list. Change the size according to the network environment in use. The default value is 1500.
IP address	Specify an IP address to be set for the port.
Subnet mask	Specify a subnet mask or subnet prefix to be set for the port.
Gateway address	Specify a gateway address to be set for the port.

c. Clicking **OK** applies the change of settings to the list.

d. When you click **Next** after changing the port settings as needed, the port settings are made.

CAUTION: Please perform another setup after waiting about 30 seconds after processing when a setup or change of an IP address is made. When MTU is changed, communication with other ports in addition to the iSCSI port may temporarily be interrupted.

2. When any iSNS server is used, register the iSNS server information.

Parameter	Description
iSNS server IP address and port number list	Displays the IP address and port number of the iSNS server.
Add	Click this button to add iSNS server information. This information appears on the **iSNS server IP address and port number list**.
Edit	Select an iSNS server from the iSNS server IP address and **Port number list**. Then click **Edit** to modify the iSNS information.
Delete	Select an iSNS server from the iSNS server IP address and **Port number list**. Then click **Delete** to modify the iSNS information.

Perform any of the following steps:

- To set the iSNS servers to be monitored by the disk arrays supporting iSCSI, click **Add** to enter the necessary information. Then click **Next** to go on to **Finish initialization wizard** page.
- To not use the iSNS server, click **Next** to move on to license unlock procedure.reword

3. Confirm that the initialization is completed.

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Parameter	Description
Operate iSCSI Easy Config Tool on the host machine	The initialization is suspended to perform initialization by using iSCSI Setup Tool.
Bind pool	When you click this hyperlink, the **Pool Bind** page appears to start pool binding.

4. Perform the following operations:
   a. Click **Operate iSCSI Easy Config Tool on the host machine** to continue the initialization by using the iSCSI Setup Tool.
   b. When the following window appears, see "iSCSI Setup Tool"and perform initialization by using iSCSI Setup Tool. And then click **Bind pool** to bind pools.

iSCSI Setup Tool

Use iSCSI Setup tool on application servers to configure the settings required on the application servers.

For details of the procedure, see either of the following sections according to the platform of the application servers.

- For Windows application servers, see "iSCSI Setup Tool".
- For Linux application servers, see "iSCSI Setup Tool"

Port Mode Switching

You can change the FC, iSCSI, and SAS port mode of the disk array. This screen is displayed only for disk arrays of the SnapSAN 5000 or later.

1. Port List view:
   - The Port List view lets you check the information about the disk array ports.
   - A port number is expressed in the format of "directory number-port number".
   - The following items are displayed.
     - Port Number
     - Port Name
   - Mode
     - WWN: Port in the WWN mode
     - Port: Port in the Port mode.
   - Configuration lock
     - Lock: Locked port
     - (Empty): Port not locked
   - Unselectable Reason
     - The following items are hidden by default.
   - Host
     - To display any of these items, right-click the item name and set **Display** for the relevant item.
2. WWN Mode and Port Mode radio buttons:
   - WWN Mode: Changes the mode of the port to the WWN mode.

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- Port Mode: Changes the mode of the port to the port mode.

3. Change All button.

   If you click this button, all the ports are changed to the mode selected with **WWN Mode** or **Port Mode**. In this case, you do not need to select a port from the port list. However, you cannot change the mode by using this button if there are any ports locked by the port configuration lock/unlock function. You cannot change to the port mode if the configuration lock function confirms that any target application server is in operation. Stop all the target application servers before performing this operation.

4. Change Selected button.

   If you select a port and then click this button, the selected port is changed to the mode selected with **WWN Mode** or **Port Mode**. You can select multiple ports in the port list if they are in the same mode. When a confirmation screen is displayed for checking the settings in advance, check the current mode of the port and the mode you are changing to. However, you cannot change the mode of a port locked by the port configuration lock/unlock function. You cannot change to the port mode if the configuration lock function confirms that any target application server is in operation. Stop all the target application servers before performing this operation.

Finish Initialization Wizard

5. Confirm the initialization is finished.

Bind Pool

When you click this hyperlink, the **Pool Bind** page appears for starting pool binding.

Initialization Wizard

6. To move on to pool binding, click **Bind pool**.

CAUTION: When the initialization is complete, the Access Control function starts automatically.

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Binding a Pool

Perform basic settings for binding a pool.

Parameter	Description
Show pool list	Click Show pool list to see the list of existing pools. Click Close pool list to hide the pool list.
Physical disk type	Select the type of physical disks that configure a pool.
RAID type	Select the RAID type of the pool.
Auto disk selection	Specify the number of physical disks to be used from the **Number of physical disks** and the capacity per physical disk from **Physical disk capacity**. The selectable numbers of physical disks are: RAID6(4+PQ): 6 disks or more RAID6(8+PQ): 10 disks or more RAID5(2+P): 3 disks or more RAID5(4+P): 5 disks or more RAID5(8+P): 9 disks or more RAID-TM: 3 disks or more RAID1: 2 disks or more
Manual disk selection	Select this option and click **Select physical disks** to manually select physical disks to be used for a pool.
Calculate pool capacity	Click this button to see an estimated capacity of a pool in **Total capacity of the pool**. When **Physical disk type**, **RAID type**, **Number of physical disks**, **Physical disk capacity** is changed, there is possibility that "calculating" is displayed temporarily under **Total capacity of the pool.**

Perform the following steps to bind a pool:

1. Select the type of physical disk from **Physical disk type**.
2. Select the type of RAID from the **RAID type** drop-down list menu.
3. Select the number of physical disk that configure the pool and their capacity using either **Auto disk selection** option or **Manual disk selection** option.

CAUTION: When 61 or more physical disks configure a pool, pool expansion is automatically performed. The value for **Total capacity of the pool** displayed for a pool configuration with 61 or more physical disks is rough estimate.

4. Click **Next** to move on to the step for checking settings.

The page for confirming the settings of pool binding appears. This page lists the settings of the pool to be bound.

Parameter	Description
Basic Settings	Displays basic settings to be used for binding a pool.
Advanced Settings	Displays default advanced settings to be used for binding a pool.

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Parameter	Description
Advanced	Click **Advanced** to modify the default settings displayed under **Advanced Settings**.
Physical disks to configure the pool	Displays details of physical disks used to configure a pool.

5. Check if the list has any problems. If the list has no problems, click **Set** to display the confirmation message
6. Click **Yes** to perform pool binding. When the binding is completed, the completion window appears.

CAUTION: When a physical disk to be used is stopped with the power saving function on, it takes time to bind the pool.When the first pool is bound, a system value (8GB) is automatically created.

When the pool binding is successfully completed, the result of pool binding appears.

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Parameter	Description
Bind another pool	Click this hyperlink to reopen the **Pool Bind** page to bind another pool.
Bind hot spare	Click this hyperlink to open the **Hot Spare Bind** page.
Bind logical disk	Click this hyperlink to open the **Logical Disk Bind** page.

Perform one of the following steps:

- Click **Bind hot spare** to bind hot spare.
- If you do not want to bind hot spare, click **Bind logical disk** to move on to logical disk binding.

Binding a Hot Spare

This section explains how to bind a hot spare.

The **Hot Spare Bind** page has the view display and the list display. The displays can be switched by clicking the tabs.

Perform the following steps to bind a hot spare:

Parameter	Description
List	By default, the List view is displayed. The List view displays a list of physical disks available to bind a spare. Select the specified check box of the physical disk for which hot spare will be bound.
View	Click this tab for the visual display of physical disks available to bind a spare. Select the specified check box of the physical disk for which hot spare will be bound.

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Parameter	Description
Pool list	Select a physical disk to create a hot spare. When you select the physical disk for hot spare binding, Enabled is displayed under the **Enable Hot Spare** field of the Pool list. Pools that are enabled by a newly bound hot spare are shown in bold.
Enable the copy back mode	Select this option to enable copy back mode. When a faulty disk is replaced by a new disk, copy back mode automatically copies back the data to the new disk.

1. Select one or more **physical disks** for hot spare binding.
   When you select the physical disks, pools with Enable Hot Spare are displayed in bold letters.

CAUTION: For slots having no physical disks, the slot names and check boxes are grayed out in the view display, and the slots are not listed in the list display. For physical disks for which a pool has been bound, the check boxes are grayed out in the view display, and the disks are not listed in the list display.

2. Click **Set** to display the following confirmation message.
3. Click **Yes** to perform hot spare binding.

When the hot spare binding is completed, the result dialog box appears.

Parameter	Description
Bind another hot spare	Click this hyperlink to reopen the **Hot Spare Bind** page to bind another hot spare.
Bind pool	Click this hyperlink to open the **Pool Bind** page to bind another pool.
Bind logical disk	Click this hyperlink to open the **Logical Disk Bind** page.

Binding Logical Disks

This section explains how to bind logical disks.

Perform the following steps for binding a logical disk.

Parameter	Description
Pool information	Displays pool information.
Basic logical disk settings	Displays the basic settings to be used for binding logical disks.
Logical Disk Advanced Settings	Displays default advanced settings to be used for binding a logical disk.
Advanced	Click **Advanced** to modify the default settings displayed under **Logical disk advanced settings**.
Logical disks to be bound	Displays the details of the logical disks to be bound.

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1. Verify the **settings** of the logical disk to be bound that are listed.
2. To perform advanced settings, click **Advanced**.
3. After confirming the settings, click **Set** to display the following confirmation message.

The result of the logical disk binding appears

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Parameter	Description
Bind another logical disk	Click this hyperlink to reopen the **Logical Disk Bind** page for another logical disk binding.
Set the host to which logical disks will be assigned	Click this hyperlink, to open the **Host Information Collection** page.
Assign logical disks to the host	Click this hyperlink to open the **Assignment of Logical Disk** page.

4. Click **Set the host to which logical disks will be assigned** to retrieve the information of the host to which logical disks that have been bound are assigned. Select how to collect host information.

Parameter	Description
Collect host information automatically (Windows, Linux or Hyper-V).	Select this option to retrieve host information automatically by showing the volume for information retrieval to all hosts.
Update with host information file.(Windows, Linux or Hyper-V)	Select this option to configure host information by using the files for host information retrieved on application servers.
Create host information manually. (Windows, Linux, VMware or Hyper-V)	Select this option by manually entering interfaces with hosts, host names, platforms, WWPNs, and port numbers to configure host information.

5. Select **Collect host information automatically (Windows or Linux)** and click **Next**. The confirmation dialog box appears.
6. Click **Yes**. The **Host Information Collection - Registration** screen appears.

Parameter	Description
Show collected information	Click this button to retrieve the host information collected by the disk array controller.

7. Confirm whether the information on all the hosts is retrieved, and then click **Yes**.

On Windows, it may take a few minutes to retrieve information. Wait for a few minutes before clicking **Show collected information.**

On Linux, This chapter describes how to initialize a disk array configured for FC, iSCSI, and SAS connections.

This chapter describes how to initialize a disk array configured for FC, iSCSI, and SAS connections.

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CAUTION: run the command to register the host information on hosts before clicking **Show collected information**.

Depending on connected switches or HBA settings of hosts, link up may fail or take time, which result in failure of host information retrieval. The result of the logical-disk binding appears.

Parameter	Description
Assign logical disks to the host	Click this hyperlink to assign the bound logical disks to hosts whose information has been retrieved.

Assignment of Logical Disks

Assign logical disks to hosts.

Parameter	Description
Host List	Displays hosts registered with the disk array. Click a host to which you want to assign logical disks.
Register information of a host	Click this hyperlink if you cannot find the target host listed in the **Host list** and want to jump to the **Host Information Collection** page.
Show all assignable logical disks	Select this check box to display all logical disks that can be assigned.
Select drop-down list	Select the logical disk list display type from the drop-down list.
LD List	Displays the list of logical disks bound in the disk array. Click a logical disk you want to assign.

CAUTION: The display items can be sorted, however, the order cannot be changed.

Multiple logical disks can be selected at the same time.

Perform the following steps:

1. Select hosts from the **Host List** to which logical disks will be assigned.
2. Select logical disks from the **LD List** to which hosts will be assigned.
3. Click **Next**.

Parameter	Description
Host List	Displays the hosts to which logical disks will be assigned.
LDs Assignable to Host	Displays logical disks to be assigned to the host.
Change LUN	Click this button to open the LUN Settings page, which allows configuring LUN (Logical Unit Number) setting.

4. Check the setting and click **Set** to perform the logical disk assignation. When the assignation is completed, the completion page appears.

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Assignment of Logical Disk - Finish

Parameter	Description
Assign logical disks to another host	Click this hyperlink to assign another logical disk to the host.
Register information of a host	Click this hyperlink to open the **Host Information Collection** page.

5. Click **Finish**.Multiple logical disks can be selected at the same time.

Checking Connection from Application Servers

Check connection from the application servers by following the procedure described in one of the following:

- For a Windows environment, see "Check Connection from Application Server - Windows Environment".
- For a Linux environment, "Checking Connection from Application Server - Linux".

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Chapter 5

Performance Monitoring

This chapter describes how to use the Performance Monitor (performance monitoring function). The performance monitoring function is for monitoring the performance of the SnapSAN S3000/S5000 disk array subsystem, collecting performance information, and displaying the performance in real-time. See *"Performance Monitor User Guide"*.

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Troubleshooting

Overview Troubleshooting

This chapter provides information on troubleshooting errors including the following:

"Troubleshooting According to Device Conditions"
"Network Setting Tool Errors"
"SnapSAN Manager Errors"
"iSCSI (Windows) Setup Tool Errors - Windows"
"Path Manager (Windows) Errors"
"Path Manager (Linux) Errors"
"Changing Network Settings for Monitoring Disk Arrays from SnapSAN Manager""
"User Support""

Disk Array Controller Power and Disk Enclosure Power

The front view of a disk array controller, a disk enclosure and disk drives (without the front bezel).

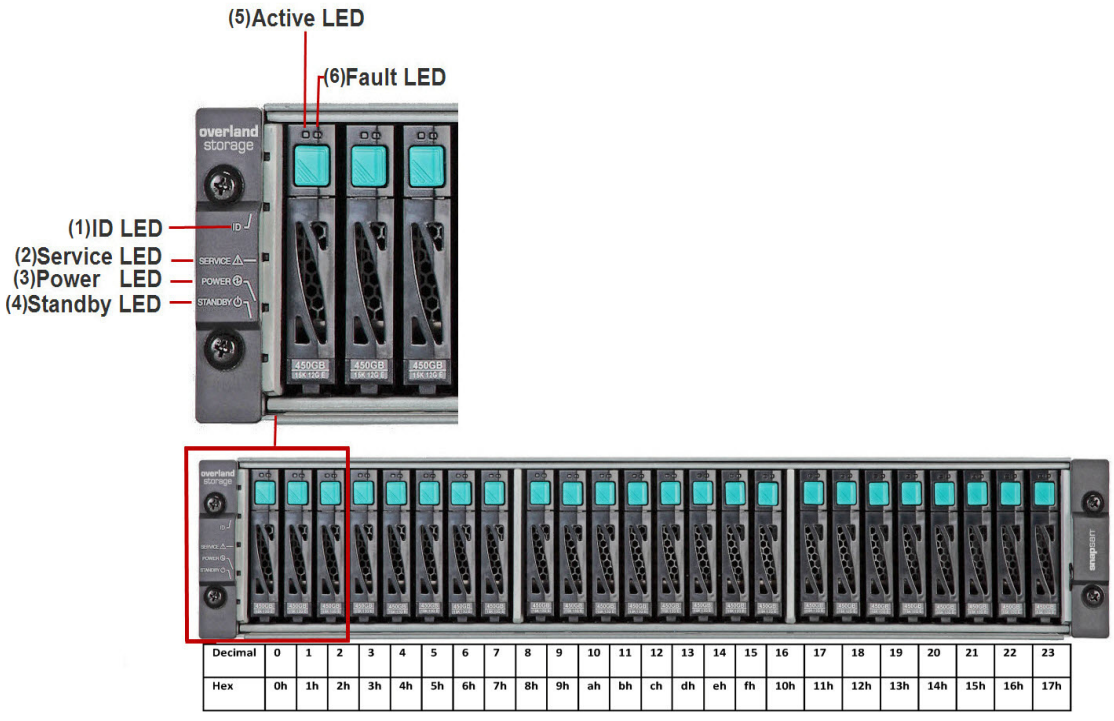
(5)Active LED
(6)Fault LED
(1)ID LED
(2)Service LED
(3)Power LED
(4)Standby LED
overland storage
ID
SERVICE
POWER
STANDBY
450GB
Decimal 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hex 0h 1h 2h 3h 4h 5h 6h 7h 8h 9h ah bh ch dh eh fh 10h 11h 12h 13h 14h 15h 16h 17h

Figure 6-1: Front View - 2.5 inch Disk Array Unit LEDs

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Figure 6-2: Front View - 3.5 inch Disk Array Unit LEDs

The following tables describe the ID LED, LED Status, Service LED, and Power LED.

Table 6-1: Disk Array Unit ID Status

(1) ID LED	Status
Off	Not selected
On	Selected

Table 6-2: Disk Array Unit Service/Power Status

(2) Service LED	(3) Power LED	Status
Off	On	Running successfully.
On	On	Maintenance required or performed (e.g. during recovery).
On 0.2 seconds Off 0.2 seconds	On	During power on.
On 4 seconds Off 8 seconds	On	Maintenance required (Backup has failed. Written data may have vanished.)
On 1 second Off 1 second	On	Firmware updated online.
Off	On 0.2 seconds Off 0.2 seconds	Auto flashing (*) has finished and power can be turned off.
Off	Off	Powered off.

When access to a host connection port is disconnected for five minutes, transition to this mode takes place automatically in preparation for power-off. When access from the host connection port is restored, ordinary status is restored.

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Table 6-3: Disk Array Unit Standby Status

(4) Standby LED	Description
Off	DC on and off operation is not available
On	DC on and off operation is available

Table 6-4: Disk Array Unit Active/Fault Status

(5) Active LED	(6) Fault LED	Description
Off	Off	Powered off.
On	Off	Ordinary (READY)
Flashing	Off	Ordinary (in the course of ACCESS)
Flashing	Flashing	Recovered
On	Flashing	Hard disk drive save-energy mode
On	On	Failure

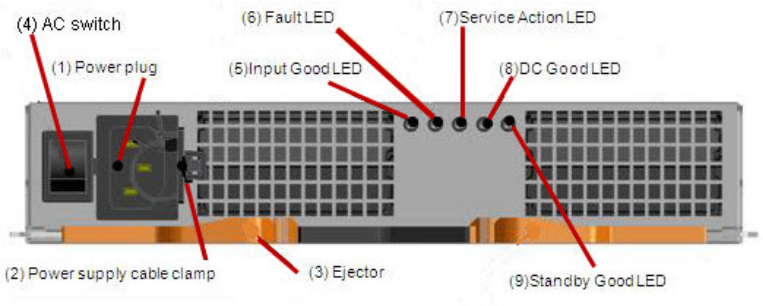

Figure 6-3: LED Display - Disk Array Controller Power and Disk Enclosure Power

Table 6-5: Disk Array Unit, Controller, Power Status

(1) Input good LED	(2) Fault LED	(3) Service action LED	(4) DC good LED	(5) Standby good LED	
Green	Orange	Blue	Green	Green	Status
On	Off	-	On	-	Running successfully.
On	On	-	On	-	Problem in power supply fan. Power supply temperature warning.
On	On	-	Off	-	Power supply output problem. Power supply temperature problem.
On	-	-	-	On	INPUT-ON (12V and 5V no output, 5Vstb output).
Off	-	-	-	-	Input problem.

The service action LED is On when directed by a device connected to a port or the system.

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Controller (CONT)

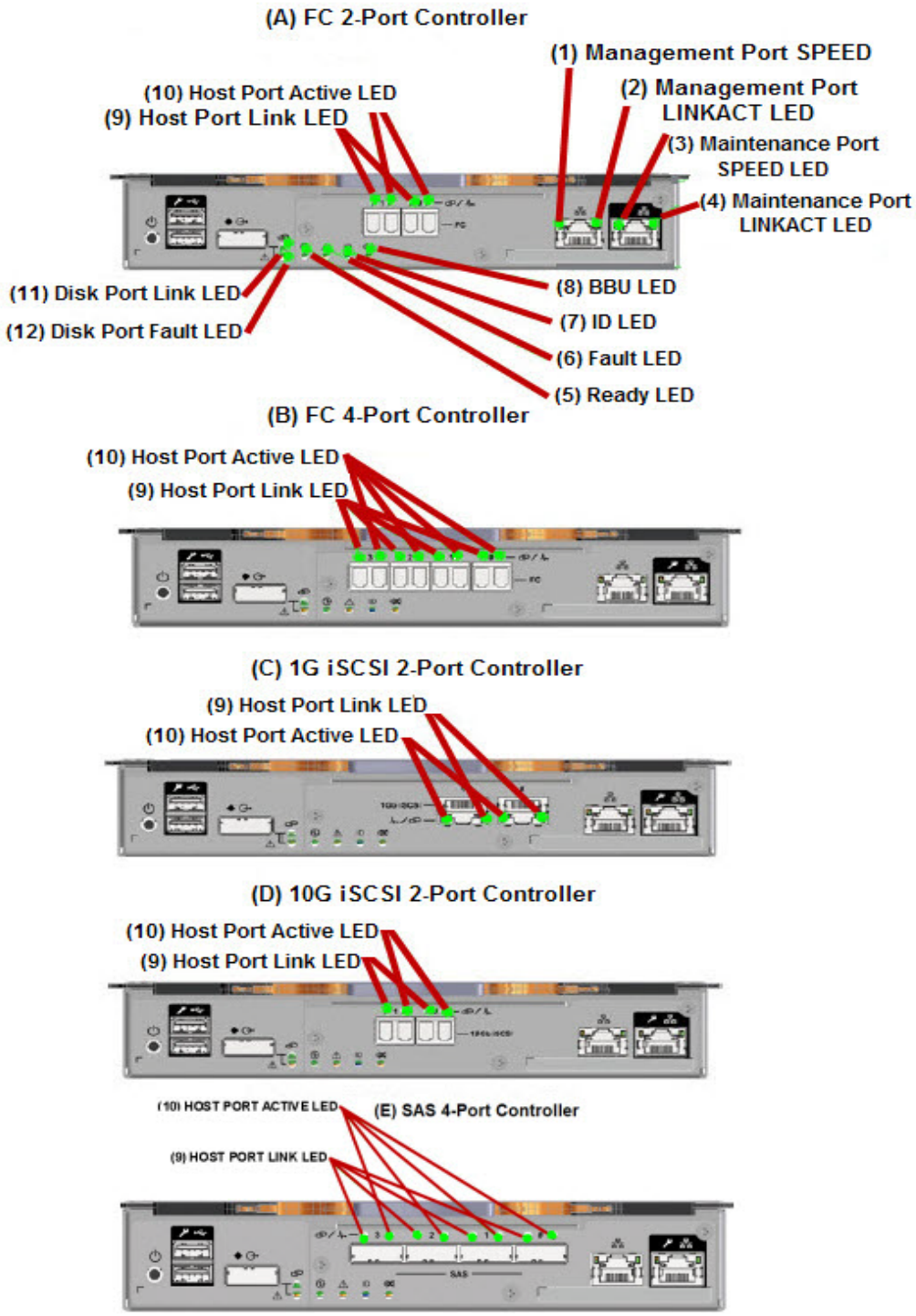
(A) FC 2-Port Controller
(1) Management Port SPEED
(2) Management Port LINKACT LED
(3) Maintenance Port SPEED LED
(4) Maintenance Port LINKACT LED
(10) Host Port Active LED
(9) Host Port Link LED
(11) Disk Port Link LED
(12) Disk Port Fault LED
(8) BBU LED
(7) ID LED
(6) Fault LED
(5) Ready LED
(B) FC 4-Port Controller
(10) Host Port Active LED
(9) Host Port Link LED
(C) 1G iSCSI 2-Port Controller
(9) Host Port Link LED
(10) Host Port Active LED
(D) 10G iSCSI 2-Port Controller
(10) Host Port Active LED
(9) Host Port Link LED
(10) HOST PORT ACTIVE LED
(E) SAS 4-Port Controller
(9) HOST PORT LINK LED

Figure 6-4: LED Display - Disk Array Controller (CONT)

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Table 6-6: Controller Port Status

Management Port/Maintenance Port	LED Status
(2) Management port LINK/ACT LED (green) (4) Maintenance port LINK/ACT LED (green)	On when connected. Flashes when data is transferred.
(1) Management port SPEED LED (green/orange) (3) Maintenance port SPEED LED (green/orange)	On in green when operating at 100 Mbps. On in orange, when operating at 1 Gbps:

Table 6-7: Controller Status

(5) Ready LED	(6) Fault LED	(7) ID LED	(8) BBU LED	
Green	Orange	Blue	Orange	Status
On 1 second Off 1 second	Off	-	-	Running successfully.
Flashing fast	Off	-	-	Shutting down or backing up data in the memory.
On	Off	-	-	Starting up or rebooting.
On	On 1 second Off 1 second	-	-	Waiting for the disk enclosure behind the given enclosure to be powered on.
On	On	-	-	Failure has occurred.
Flashing fast	On	-	-	Failure has occurred (log collectable).
On 1 second Off 1 second	On	-	-	Retrying as disk enclosure shortage has been detected. Disk Port blocked.
On 1 second Off 1 second	Flashing fast	-	-	Updating firmware online.
-	-	On	-	The device is selected.
-	-	-	On	Detected BBU failure.
-	-	-	Flashing	Warning for the end of the BBU life cycle

Table 6-8: Controller Host Port Status

Host port	Status
(9) Link LED (L) (green)	On = linkup Off = link down

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Table 6-8: Controller Host Port Status

Host port	Status
(10) Active LED (A) (green)	On or flashing = I/O access
Link/Active flashing together	Flashing in a cycle of 2 seconds = Off line Flashing in a cycle of 1 second = Powering off Other than above = Invalid port settings

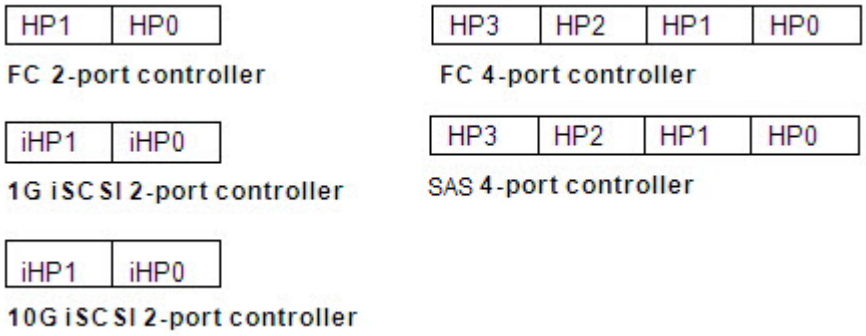

Figure 6-5: Location and Port Number

Table 6-9: Controller Disk Port Status

Disk Port	Status
(11) Link LED (LNK) (Green)	On = linkup Off = link down
(12) Fault LED (FLT) (Orange)	On = An error is detected Off= Normal

Adapter (ADP)

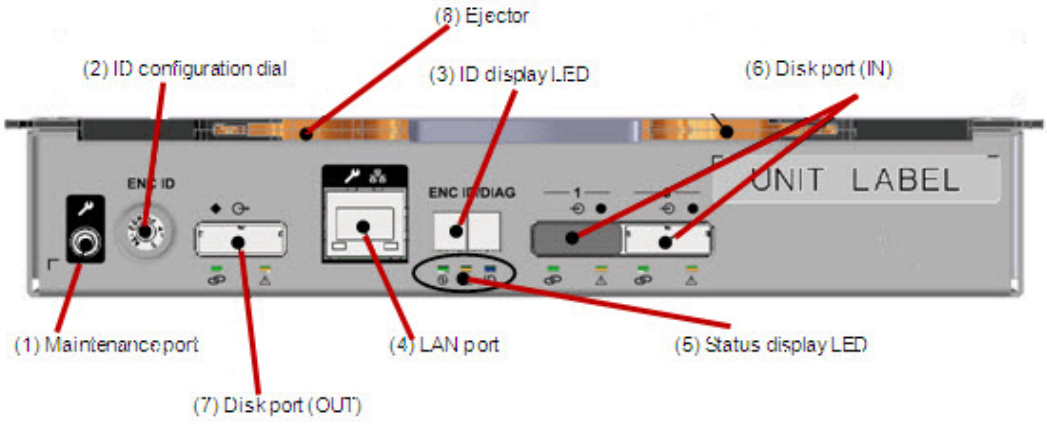

Figure 6-6: LED Display - Disk Array Enclosure Adapter

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Table 6-10: Adapter LED Status

(1) Ready LED	(2) Fault LED	(3) ID LED	
Green	Orange	Blue	Status
Off	Off	-	Not connected or, not powered on.
Flashing	Off	-	Running successfully.
Flashing	Flashing in a cycle of 0.5 second	-	Initializing firmware.
Flashing	Flashing in a cycle of 1 second	-	Error between adapters has been detected.
Flashing	On	-	Error in the adapter has been detected. (Operation continued).
Off	On	-	Error in the adapter has been detected. (Unable to continue operation).
-	-	On	The device is selected.

Table 6-11: Adapter Disk Port Status

Disk port	Status
(4) Link LED (LNK) (Green)	On = linkup Off = link down
(5) Fault LED (FLT) (Orange)	On = An error is detected Off= Normal

Figure 6-7: Location and Port Number - DP-OUT, DP-IN

NOTE: DP1-IN is not used under normal operation.

Troubleshooting According to Device Conditions

In this section, troubles are classified as follows, according to the location where the trouble occurs.

1. Table 6-12: Trouble in Disk Array Unit (Front Panel LED Status)
2. Table 6-13: Trouble in Disk Array Unit (Rear Panel Controller LED Status)
3. Table 6-14: Trouble in Disk Array Unit or Disk Enclosure (Rear Panel Power LED Status)
4. Table 6-15: Trouble in Disk Enclosure
5. Table 6-16: Wrong SAS Cable Connection
6. Table 6-17: Trouble in Linkup of Host Port

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Table 6-12: Trouble in Disk Array Unit (Front Panel LED Status)

Condition	Cause and Action
POWER LED (green) is on, and SERVICE LED (orange) is off	This is not a fault. This indicates that the disk array unit is in normal operation after turning on.
POWER LED (green) and SERVICE LED (orange) are off	This indicates the disk array unit power-on sequence has not been completed. It takes several minutes for the POWER LED to turn on after turning on the unit. If LEDs do not turn on within 10 minutes, check the following: Confirm that power is being supplied to the unit. Confirm that INPUT GOOD LED on the back of the unit is on. If it is off, check the cable connection and power source.
POWER LED (green) and SERVICE LED (orange) are on	This indicates that the disk array unit or connected disk enclosure requires maintenance. Since there are two or more maintenance requests at the same time, check all of the following: • Confirm that power is being supplied to both PS0 and PS1 in the disk array unit or connected disk enclosure. To ensure that power is being supplied, confirm that POWER LEDs of the disk array unit and disk enclosure are on. • When SERVICE LED of the connected disk enclosure is on, refer to the description of "SERVICE LED is on". • When the last operation is maintenance, processing such as disk recovery may take time. Ask the maintenance personnel for the estimated time of completion. If the disk is not recovered beyond the estimated time, ask the maintenance personnel to investigate.
POWER LED (green) is on and SERVICE LED (orange) blinks at intervals (on for 1 second and off for 1 second)	This indicates that the power-on sequence or download sequence of the disk array unit is in progress. The sequence will take several minutes to complete. If SERVICE LED continues to blink for over 10 minutes, there may be a failure. Do not turn off the power or AC power while SERVICE LED is blinking.
POWER LED (green) is on and SERVICE LED (orange) blinks at intervals (on for 4 seconds and off for 8 seconds)	This indicates that battery backup failed in the last power-off state. Files may be corrupted. Restore those files using backup files. This may occur because of the following causes. Address the appropriate cause to remove the problem. A backup device such as a flash memory was destroyed. Replace the controller. Battery backup was performed past the battery life span. The disk array unit was continuously used or has been used at a temperature higher than the predetermined temperature. In the cases other than 1, the battery backup retention time of the battery cannot be guaranteed. It is necessary to replace the battery due to its life span. Contact your sales or maintenance service agent. (There is a charge for battery exchange due to life span.) For the procedure to recover from this condition, refer to "Notes on Powering On the Disk Array System".
POWER LED (green) blinks at intervals (on for 0.2 seconds and off for 0.2 seconds), and SERVICE LED (orange) is off	This is not a fault. This indicates that the disk array unit can be turned off by performing automatic flash because the host port is disconnecting for 5 minutes. When the host port recovers, the unit returns to a normal state.

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Table 6-13: **Trouble in Disk Array Unit (Rear Panel Controller LED Status)**

Condition	Cause and Action
READY LED (green) is on, and FAULT LED (orange) is off	This indicates that the power-on sequence or rebooting is in progress. The sequence will take several minutes to complete. If this condition continues for over 10 minutes, there may be a failure.
READY LED (green) blinks (on for 1 second and off for 1 second), and FAULT LED (orange) is off	This is not a fault. This indicates that the controller is in normal operation.
READY LED (green) blinks rapidly, and FAULT LED (orange) is off	This indicates that power has been disrupted, or automatic shutdown or memory backup is being performed. The sequence will take several minutes to complete. If this condition continues for over 10 minutes, there may be a failure.
READY LED (green) is on, and FAULT LED (orange) blinks (on for 1 second and off for 1 second)	This indicates that subsequent disk enclosures are not turned on. Turn on the disk enclosures.
READY LED (green) and FAULT LED (orange) are on	This indicates that there is a maintenance request because a failure was detected. Analyze the error and then remove the cause.
READY LED (green) blinks (on for 1 second and off for 1 second), and FAULT LED (orange) is on	The subsequent disk enclosures cannot be found, or the disk ports are disconnected. Check whether the cables are correctly connected to the disk ports.
READY LED (green) blinks (on for 1 second and off for 1 second), and FAULT LED (orange) rapidly blinks	This is not a fault. This indicates that device firmware is being updated. When updating is complete, the device returns to a normal state.
BBU LED (orange) is on	This is not a fault. The battery is being recharged.

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Table 6-13: **Trouble in Disk Array Unit (Rear Panel Controller LED Status)**

Condition	Cause and Action
LNK/ACT LED (green) of the management port is out, or blinks	When connecting a cable to the management port, LNK/ACT LED (green) may not turn on because of the following causes. • The power of the HUB, switch, or server to connect to has not been turned on. • The power supply of the HUB, switch, or server to connect to is at fault. • The cable type is wrong. • A cross cable and straight cable are not recognized automatically. Use a cable following the predetermined connection method. • The Speed and Duplex settings do not match. • Auto Detect is set as default. Since connecting to a device in Full Duplex mode could cause abnormal operation, set Auto Detect or Half Duplex to the device to connect. • (To set Full Duplex, ask your sales or maintenance service agent.) • Depending on the type of hub, it may remain off or it may blink.
SPEED LED (Green/Orange) of the management port is on or blinks	This is not a fault. SPEED LED (Green/Orange) is on when connection is established through the disk array unit monitoring protocol with a cable connected to the management port. If the cable is removed from the unit, SPEED LED briefly remains on.

Table 6-14: **Trouble in Disk Array Unit or Disk Enclosure (Rear Panel Power LED Status)**

Condition	Cause and Action
INPUT GOOD LED (green) is on, FAULT LED (orange) is off, and DC GOOD LED (green) is on	This is not a fault. This indicates that AC input is being supplied to the unit and DC output is in normal operation.
INPUT GOOD LED (green) is off.	AC input is not being supplied. Check whether the power supply cable is correctly connected. If the cable is correctly connected, replace the power supply.
INPUT GOOD LED (green), FAULT LED (orange), and DC GOOD LED (green) are on	This indicates that the power fan error was detected or the temperature within the power supply reached the warning value. Replace the power supply. The unit has dual power supply configuration. Therefore, SERVICE LED turns on when FAULT LEDs of both PS0 and PS1 are on.
INPUT GOOD LED (green) is on, FAULT LED (orange) is on, and DC GOOD LED (green) is off	This is not a fault. This indicates that DC output error or temperature error within the power supply was detected. The unit has a dual power supply configuration. Therefore, SERVICE LED turns on when FAULT LEDs of both PS0 and PS1 are on.
STANDBY GOOD LED (green) is on	This is not a fault. The disk array unit is in standby state.

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Table 6-15: **Trouble in Disk Enclosure**

Condition	Cause and Action
POWER LED (green) is on, and SERVICE LED (orange) is off	This is not a fault. This indicates that the disk enclosure is in normal operation after turning on.
POWER LED (green) is off	This indicates that starting the disk enclosure has not been completed. The power of the disk enclosure is turned on in conjunction with the power of the connected disk enclosure or disk array unit. • It takes several minutes until POWER LED of the disk enclosure turns on after turning on the unit power. • If POWER LED does not turn on within 10 minutes, check the following. • Check whether INPUT GOOD LED of the disk enclosure power supply is on, indicating that the power is supplied to the disk enclosure. • Check cable connection status to confirm whether this disk enclosure is normally connected to other disk enclosures or the disk array unit. • Check POWER LED of the disk array unit to confirm whether the power of the disk array unit was turned on. If this LED is out, check whether the power source is functioning normally.
SERVICE LED (orange) is on	This indicates that the disk enclosure is out of order or maintenance has not been completed. When the last operation is maintenance, processing such as disk recovery may take time. Ask the maintenance personnel for the estimated time of completion. If the disk is not recovered beyond the estimated time, ask the maintenance personnel to investigate.

Table 6-16: **Wrong SAS Cable Connection**

Condition	Cause and Action
It is necessary to change the disk enclosure connection	If a pool, logical disk or spare has been built, it is necessary to release it before changing the connection. Turn off the disk array unit, and then change the SAS cable connection. Next, turn on the unit, and then wait until the unit is ready. Changing the SAS cable connection is then complete.

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Table 6-17: **Trouble in Linkup of Host Port**

Condition	Cause and Action
Logical disk in disk array is not visible from application server (host). Connection between the disk array and destination (host/switch/RD port) does not linkup. Connection between the disk array and destination (host/switch/RD port) takes time to linkup.	There is possibility that "Data Rate" / "Server Connection Type" settings are inconsistent between disk array unit and device to be connected (host HBA / switch). Please confirm below. For details, refer to *Configuration Setting Tool User's Manual (GUI) for the SnapSAN S3000/S5000.* **Confirm Server Connection Type between application server (host)** This disk array unit can use auto configuration by setting "Server Connection Type" to Auto Negotiate. But depending on settings of switch and host HBA to be connected, there are cases that connection does not linkup or takes time. In such cases, reconfigure "Server Connection Type" appropriate to switch and host HBA to be connected. Direct Connection/FC-AL Select this option when you directly connect host connection port and application server (host) with FC cable or when you use Loop topology FC switch. FC Switch Connection (Fabric) Select this option when you connect to FC switch other than Loop topology FC switch. **Confirm Data Rate** This disk array unit can use auto configuration by setting "Data Rate" of host port to Auto Negotiate. But depending on settings of switch and host HBA to be connected, there are cases that connection does not linkup or takes time. In such cases, reconfigure "Data Rate" appropriate to switch and host HBA to be connected. For details of confirming and setting data rate of host HBA / FC switch, refer to manual of FC switch.
Connection between the disk array and destination (host/switch/RD port) does not linkup at the maximum data rate.	For the SnapSAN 3000 disk array units, the default data rate of the host port is Auto Negotiate. Therefore, automatic detection is performed. When connection between the disk array unit and the destination switch or host HBA cannot linkup at the maximum data rate by the disk array unit, use the maximum data rate supported by the switch or host HBA.

Network Setting Tool Errors

Table 6-18. Network Setting Tool Errors

Problem	Cause and Solution
The target disk array is not displayed	The network between the Network Setting Tool and the disk array may not be configured correctly. User Datagram Protocol (UDP) and the port number "2370" are used to find disk arrays. Check the network settings including the fire wall settings, configure the settings to allow packets to travel through the network, and then try finding the disk array again.

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SnapSAN Manager Errors

Errors Experienced Throughout SnapSAN Manager Usage

Table 6-19. SnapSAN Manager Usage Errors

Problem	Cause and Solution
You cannot connect to the target disk array when SnapSAN Manager embedded is started.	The IP addresses of the disk array specified may not be correct. Use the Network Setting Tool to confirm if the specified IP addresses of the disk array are correct. If these IP addresses are not correct, set the IP addresses again.
The window you have been working on is not visible.	The following factor is conceivable. Remove the factor and try your operation again. The window you have been working on may be hiding behind another window. Switch window by pressing ALT+TAB.
When access to the disk array is attempted from SnapSAN Manager Embedded (Web GUI), nothing is shown on the Web browser and the status bar, located at the bottom of the window, shows done.	The following causes are conceivable. JRE is not installed. Check JRE has been installed on the machine where SnapSAN Manager Embedded runs. If not, install JRE according to the procedure described in "Before Starting SnapSAN Manager Embedded". The security settings of the Web browser are not configured. Configure the Web browser settings by setting the URL of the connecting destination as trusted sites. Also configure the security level of trusted sites by selecting **Enable** under **Run ActiveX controls and plug ins** of **ActiveX controls and plug-ins**. For details of the settings, see "Before Starting SnapSAN Manager Embedded". The network is congested. When SnapSAN Manager Embedded (Web GUI) is started, it downloads files required for its operation from the disk array. Depending on the network traffic, it may take time. Wait for a few minutes for the download to complete.
When access to the disk array is attempted from SnapSAN Manager Embedded (Web GUI), the message "Warning - Security" is shown.	This message indicates the digital signature of SnapSAN Manager Embedded has been successfully verified. Check the name is "SnapSAN Manager" and the publisher is "Orland Storage Inc,", and then click **Run**. If you select the **Always trust content from this publisher** check box and then click **Run**, the message will not be shown the next time you start SnapSAN Manager Embedded.
When access to the disk array is attempted from SnapSAN Manager Embedded SnapSAN Manager Embedded Client (Web GUI), the **Windows Security Alert** dialog box tells a Web browser function is blocked	The function is blocked by a fire wall. Click **Unblock** on the dialog box or configure the fire wall settings in advance so that your Web browser is not blocked.

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Table 6-19. SnapSAN Manager Usage Errors

Problem	Cause and Solution
When access to the disk array is attempted from SnapSAN Manager Embedded Client (Web GUI), the Java icon continues to be shown on the Web browser window and the login window does not appear.	The connection may fail when your Web browser is configured to go through a proxy server. In this case, configure the proxy exception of the Web browser so that disk array is connected without going through a proxy server. Follow the steps below. Perform Step 1 through 3 only when Internet Explorer is used. Click **Control Panel**, and **Internet Options**. On the **Connections** tab click **LAN Settings** to open the **LAN Settings** dialog box. If the **Use a proxy server** check box is not selected, the following procedure is not necessary. If this check box is selected, click **Advanced** to open the **Proxy Settings** dialog box. Add both the host name and the IP address to the **Do not use proxy server for addresses beginning with box**. Steps from 4 should be performed if your browser is Internet Explorer or Firefox. Follow the steps below to check the JRE proxy settings Select **Control Panel**, **Java** and **Network Setting** to see whether the **User browser settings** check box has been selected. If not, click **Advanced** to add both the host name and the IP address of the connecting destination to the **Exceptions** box. 5.Exit and restart Web browsers.
While a controller failure occurs, it takes time from 20 minutes to 30 minutes to process the configuration of the disk array from SnapSAN Manager Embedded.	A controller failure may cause the delay of processes. Configure the disk array after restoration of the controller. If you have to configure the disk array while a controller failure occurs, take the following measure: • When SnapSAN Manager Express is being used Configure the disk array by using ControlCommand. For details of CLI, see *SnapSAN Manager CLI Command Reference*. • When SnapSAN Manager is being used Remove once the IP address of the faulty controller from a monitoring target of SnapSAN Manager, and restart the server. Add the IP address again after restoration of the controller, and restart SnapSAN Manager Server.

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Errors in Initialization

Table 6-20. Errors in Initialization

Problem	Cause and Solution
Configuring any the following failed. • Setting disk array subsystem name. • Setting the time (synchronization with the NTP server) • Setting the time (manually) • Unlocking a license • Setting host connection port (iSCSI) • Setting iSNS server • Setting host connection port (FC) • Port mode switching • Setting host connection port (SAS)	It is conceivable that a disk array problem or communication error between the disk array and a client has occurred. Check if the disk array or the client has a problem. Fix the problem and then perform initialization again.
An error occurred in the completion page of the initialization.	This problem may occur when the next generation Java plug-in is not disabled. See "Before Starting SnapSAN Manager Embedded" to disable the next generation Java plug-in, and then perform the initialization again.
Whenever SnapSAN Manager is started, the dialog prompting to start initialization is displayed.	This problem occurs when initialization is not completed successfully. Start the initialization wizard and complete it successfully.

Errors in Pool Binding

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Table 6-21. Pool Binding Errors

Problem	Cause and Solution
Pool binding failed.	It is conceivable that a disk array problem or communication error between the disk array and the client has occurred. • Check if the disk array or the client has a problem. • Fix the problem and then select Pool on the tree of the main screen to check the list of pools. • If there is no newly bound pool, try pool bind again. • If there is any newly bound pool, right-click the pool to check its properties. • If the status of the pool is normal and physical disks are displayed on the list of physical disks without any problem, the pool has been bound successfully. You do not need to bind the pool again. • If the status of the pool is not normal or physical disks are not displayed on the list of physical disks, the pool is bound abnormally. Use the configuration menu to unbind the pool and then bind the pool again.
Creating a system volume failed.	It is conceivable that a disk array problem or communication error between the disk array and the client has occurred. Check if the disk array or any client has a problem. Fix the problem and then click **Monitor** and **Fault Information** on the main screen to see the Fault Information window. When a message “System area (Logical disk number) has become fault.” is displayed, delete the system volume by selecting Logical Disk and Logical Disk Unbind. Create a system volume by selecting Logical Disk and Logical Disk Bind (for system...). When a message “Storage System Volume (System Volume) is not built.” is displayed, create a system volume by selecting Logical Disk and Logical Disk Bind (for system...). If neither of the messages (a) and (b) is reported, the system volume is successfully created. You do not need to re-create it.

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Errors in Hot Spare Binding

Table 6-22. Hot Spare Binding Errors

Problem	Cause and Solution
Hot spare binding failed.	It is conceivable that a disk array problem or communication error between the disk array and the client has occurred. Check if the disk array or any client has a problem. Fix the problem and then click physical disk on the main screen to see the list of physical disks. If the physical disk on which hot spare binding has been performed is categorized as "not set", try hot spare binding again. If the physical disk on which hot spare binding has been performed is categorized as Hot Spare, binding hot spare is successfully completed. You do not need to perform hot spare binding again.

Errors in Logical Disk Binding

Table 6-23. Logical Disk Binding Errors

Problem	Cause and Solution
Logical disk binding failed.	It is conceivable that a disk array problem or communication error between the disk array and the client has occurred. Check if the disk array or the client has a problem. Fix the problem and then select Logical Disk on the tree of the main screen to check the list of logical disks. If all the logical disks specified in logical disk binding are bound, the logical disk binding has been completed successfully. You do not need to perform the logical disk binding again. If any logical disk specified in the logical disk binding is not bound, perform the logical disk binding again.

Errors in Retrieving Host Information

Table 6-24. Retrieving Host Information Errors

Problem	Cause and Solution
Automatic collection of host information was performed but no host is shown.	The following causes are conceivable. 1. FC cables between the disk array and hosts are not connected correctly. 2. SnapSAN Manager Agent Utility is not installed on the hosts or the hosts are not running. 3. The command has not been executed on Linux hosts. Check the following, fix the problem, and then try collecting the host information again. 4. Check the disk array and hosts are connected correctly with direct connection or via FC switches. Check the host ports connectivity and accessibility. 5. Install SnapSAN Manager Agent Utility on the hosts, start running the hosts and try collecting the host information again. 6. For the Linux hosts, you need to open the window to register the host information and run the `iSMcc_hostinfo -store` command on the hosts. After running the command, click **Show collected information**.

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Assigning Logical Disk Errors

Table 6-25. Assigning LD Errors

Problem	Cause and Solution
Assigning logical disks failed.	It is conceivable that a disk array unit problem or communication error between the disk array and the client has occurred. Check if the disk array unit or the client has a problem. Fix the problem and then perform assigning logical disks again.

iSCSI (Windows) Setup Tool Errors - Windows

Table 6-26. iSCSI Setup Tool (Windows) Errors

Problem	Cause and Solution
The message, “The tool has already been started.” is displayed and the iSCSI Setup Tool cannot be started.	The iSCSI Setup Tool is already up and running. Click **OK** to close the error message and terminate the running iSCSI Setup Tool. Then, start the iSCSI Setup Tool again.
The message, “The host name should be up to 15 characters in length. A host name can include alphanumeric characters and hyphens(-).” is displayed and the iSCSI Setup Tool cannot be started.	Change the host name using only alphanumeric characters or hyphen (-) based on the restrictions of creating a target. Click **OK** to close the error message. After changing the host name, restart the iSCSI Setup Tool.
The message, “Failed to collect the serial number. (Error codex)” is displayed and the iSCSI Setup Tool cannot be started.	An error occurred in retrieving the serial number. Click **OK** to close the error message.
The message, “The tool is not set correctly.” is displayed and the iSCSI Setup Tool cannot be started.	The iSCSI Setup Tool is not installed correctly. Click **OK** to close the error message. Re-install the iSCSI Setup Tool and start it again.
The message, “No management port of the disk array is set.” is displayed and the iSCSI Setup Tool cannot be started.	The management port settings of the disk array are not configured. Click **OK** to close the error message. Set the management port and start the iSCSI Setup Tool again.
The message, “An error occurred while reporting a log file. (Error code:xxxx)” is displayed.	An error occurred during output of the log file. Click **OK** to terminate the iSCSI Setup Tool.
The message, "Unexpected error occurred." is displayed.	An unexpected error occurred. Click **OK** to terminate the iSCSI Setup Tool. Do not close the error message, generate the user dump, the event log and the log file, and contact your maintenance service provider.
When a serial number is entered, the message, “No management port of the disk array is set.” is displayed.	The host post connection settings are not configured. Perform the initialization to configure the host connection port settings. Then, run the iSCSI Setup Tool again.
When a serial number is entered, the message, “The target has already been assigned to the initiator. Serial number =” is displayed.	The target with the initiator already exists. To register the initiator again, delete the LD set to which the initiator was added by using the LD Set management of the SnapSAN Manager, and then run the iSCSI Setup Tool again.
When a serial number is entered, the message, “Failed to collect the disk array information. (Error code:xxxx)” is displayed.	An error occurred in retrieving the disk array information.

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Table 6-26. iSCSI Setup Tool (Windows) Errors

Problem	Cause and Solution
When you click Logon, the message, “Please enter a target secret.” is displayed.	The CHAP authentication check box is selected but information for Target secret and Target secret again is not entered. Enter information in the Target secret and the Target secret again boxes.
When you click Logon, the message, “Target secret unmatch. Please enter the target secret again.” is displayed.	The information entered in the Target secret does not match with that of the Target secret again. Re-enter information in the Target secret and the Target secret again boxes.
When you click Logon, the message, “Please enter a CHAP secret." is displayed.	The Mutual CHAP authentication check box is selected but information for the CHAP secret and CHAP secret again is not entered. Enter information in the CHAP secret and the CHAP secret again boxes.
When you click Logon, the message, "CHAP secret unmatch. Please enter the CHAP secret again." is displayed.	The information entered in the CHAP secret does not match with that of the CHAP secret again. Re-enter information in the CHAP secret and the CHAP secret again boxes.
When you click Logon, the message, "Logon Failed.(Error code." is displayed.	An error occurred in logging on to the target.

iSCSI Setup Tool Errors - Linux

Table 6-27. iSCSI Setup Tool (Linux) Errors

Problem	Cause and Solution
The message, "File not found." is displayed.	A file that is specified as a parameter file does not exist. Specify the file name correctly.
The message, "iSCSI Initiator is not installed." is displayed.	iSCSI Initiator is not installed. Install iSCSI Initiator, start the service, and then re-start iSCSI Setup Tool.
The message, "The parameter is invalid." is displayed.	The format of IP addresses of host connection ports specified in the parameter file is invalid. Modify the parameter file and re-start the iSCSI Setup Tool.
The message, "No parameter is set." is displayed.	Valid parameters are not entered in the parameter file. Modify the parameter file and re-start iSCSI Setup Tool.
The message, "Please enter serial number." is displayed.	A serial number is not entered in the parameter file. Modify the parameter file and re-start iSCSI Setup Tool.
The message, "Please enter target IP address." is displayed.	The IP addresses of host connection ports are not specified in the parameter file. Modify the parameter file and re-start iSCSI Setup Tool.
The message, "Please enter the target CHAP secret." is displayed.	The target CHAP secret is specified but no CHAP initiator secret is specified in the parameter file. Modify the parameter file and re-start iSCSI Setup Tool.
The message, "The tool has already been started." is displayed.	The iSCSI Setup Tool is already is up and running. Terminate the running iSCSI Setup Tool, and then restart it.

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Table 6-27. iSCSI Setup Tool (Linux) Errors

Problem	Cause and Solution
The message, "Invalid host name." is displayed.	A character other than alphanumeric characters or hyphen (-) is used for a server host name. Change the host name using only alphanumeric characters or hyphen (-) based on the restrictions of creating target. After changing the host name, restart the iSCSI Setup Tool.
The message, "Failed to collect the serial numbers. Error code:xxxx" is displayed.	An error occurred in retrieving the serial number.
The message, "No management port of the disk array is not set." is displayed.	The management port settings are not configured to the disk array. Set the management port and start the iSCSI Setup Tool again.
The message, "Host connection ports of the disk array are not set." is displayed.	The host post connection settings are not configured. Perform the initialization to configure the host connection port settings. Then, run the iSCSI Setup Tool again.
The message, "The target has already been assigned to the initiator." is displayed.	The target which is assigned to initiators already exists. To register the initiator again, delete the LD Set to which the initiator was added by using the LD Set management of the SnapSAN Manager client, and then run the iSCSI Setup Tool again.
The message, "Failed to collect the host port information. Error code:xxxx" is displayed.	An error occurs in a process of retrieving the disk array information.
The message, "Failed to log on to the target. Error code:xxxx" is displayed.	An error occurred in logging on to the target.

iSCSI Setup Tool Error Codes - Log File

iSCSI Setup Tool reports how commands have run and error messages to the following log file.

Windows

```
%iSMvol%\etc\trace\iSMiSCSISetup.log
```

Linux

```
/opt/iSMvol/etc/trace/iSMiSCSISetup.log
```

1. Error in log file output

   [Format]

   The error occurred when the log file was output.(Error code:xxxx)

   The error is reported by retrieving the error code at the time of executing Windows API function through the GetLastError function.

2. Errors in collecting the serial number.

   [Formats]

   Windows

   Failed to collect the serial number.(Error code:xxxx)

   Linux

   Failed to collect the serial numbers. Error code:xxxx

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Table 6-28. iSCSI Setup Tool (Linux) Error Codes

Error Codes	Cause
108	The IP address you have specified is used by another network equipment.
109	Target resource does not exist.
110	The disk array you have specified is being used by another tool.
111	There are multiple disk arrays with the same serial number.
112	Disk array could not be found.
201	System call failed.
202	Configuring IP address failed.
203	An internal error occurred.

3. Errors in collecting disk array information and logon.

[Formats]

Windows

Failed to collect the disk array information.(Error code:xxxx)

Logon Failed.(Error code:xxxx)

Linux

Failed to collect the host port information. Error code:xxxx

Failed to log on to the target. Error code:xxxx

a. Errors in accessing the disk array

Table 6-29. Disk Array Error Codes

Error Codes	Cause
iSM31001	A command is running.
iSM31002	An unknown error occurred.
iSM31003	Invalid option value.
iSM31004	System call failed.
iSM31005	Connection to SnapSAN Manager failed.
iSM31006	Connection to disk array failed.
iSM31007	Invalid host is specified.
iSM31008	Starting configuration settings failed.
iSM31009	The maximum number of connection.
iSM31010	SnapSAN Manager server version does not match.
iSM31011	File open error.
iSM31012	File load error.
iSM31013	File write error.
iSM31014	File close error.
iSM31015	The disk array is being configured for settings.
iSM31016	Invalid file format.

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Table 6-29. Disk Array Error Codes

Error Codes	Cause
iSM31017	Invalid command name.
iSM31018	Invalid sub-command name.
iSM31019	Invalid character sting is specified.
iSM31020	Finishing settings of configuration failed.
iSM31021	Closing the socket failed.
iSM31022	The specified OS is not supported.
iSM31023	Shortage of required options.
iSM31024	Restriction on the logical disk number (LDN) specified in the system area.
iSM31025	The maximum number of options have been exceeded.
iSM31026	Duplicated option.
iSM31027	An invalid related option has been specified.
iSM31028	Invalid option name.
iSM31029	Configuration settings are not started.
iSM31031	Unlocking licenses are not done.
iSM31044	The disk array does not support creation of LD set.
iSM31056	Upper limit of LD set creation.
iSM31057	The specified LD set name is invalid.
iSM31058	The specified LD set is not found.
iSM31059	The specified LD set exists.
iSM31060	The specified platform is not supported.
iSM31061	Operation on invalid partition.
iSM31098	Partition status has been updated.
iSM31108	The specified LD set is locked.
iSM31147	The specified platform is not supported.
iSM31150	The specified initiator set is set to another LD set.
iSM31151	The specified LD set is being used.
iSM31152	Upper limit of initiator addition.
iSM31174	Exception occurred during transmission.
iSM31175	Timeout occurred with connection to SnapSAN Manager.
iSM31208	Specified LD set is designated for FC.
iSM31212	The platform of LD set does not match that of initiator.

b. Other errors

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Table 6-30. Other Errors

Error Codes	Cause
-	An error occurred in Iscsicli or iscsiadm command. (Refer to the log file for the detail on the error.
Time Out	Timeout occurred while running a command.
Service Error	An error occurred during service startup. (Refer to the log file for the detail on the error.)
SSH Error	Error occurred during the process of SSH. (Refer to the log file for the detail on the error.)

Path Manager (Windows) Errors

Table 6-31. Path Manager (Windows) Errors

Problem	Cause and Solution
The SPS command `/lun, –getlun` failed.	When no paths are recognized by SPS, the following error may occur when the SPS command is executed. > spsadmin /lun "Operation failed." When this error occurs, check: Whether the installed HBA driver is appropriate and it is installed correctly. Refer to the installation manual of the HBA driver, and reinstall a HBA driver supported by the OS and the servers it will be installed. Whether settings of the disk array unit, including the access control and the cross call, and the FC switch settings are configured correctly. If the problem persists even after checking and performing above mentioned, please contact the Support Service.
Only one path is detected after the SPS command /lun, -getlun is run. The number of devices shown under the disk drive of the device manager is smaller than expected.	Check the following: • Whether the FC cables are connected correctly. Connect the FC cables again. • When this error occurs, check: • Whether the installed HBA driver is appropriate and it is installed correctly. Refer to the installation manual of the HBA driver, and reinstall a HBA driver supported by the OS and the servers it will be installed. • Whether settings of the disk array unit, including the access control and the cross call, and the FC switch settings are configured correctly. If the problem persists even after checking and performing above mentioned, please contact the Support Service.

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Table 6-31. Path Manager (Windows) Errors

Problem	Cause and Solution
Event ID280 (spsdsm) is generated in the system event log.	Check if the configuration of connections between the servers and the disk array unit has been changed due to an event such as replacement of an HBA or reconnection of an FC cable. Delete the old configuration information by running `spsadmin/deletemissing`.
Event ID10 (WinMgmt/WMI) is generated in the application event log.	This event is generated due to the specification of the SPS, and is not indication of abnormality. This does not affect the operation of the system. Source: WinMgmt (Case of Windows Server 2003) WMI (Case of Windows Server 2008) EventID: 10 Type: Error Description: Event filter with query "`select * from SPN_EVENTENTRY`" could not be (re)activated in namespace "//./root/WMI" because of error 0x80041010. Events may not be delivered through this filter until the problem is corrected. Or, Event filter with query "`select * from _MAM_EVENTENTRY`" could not be (re)activated in namespace "//./root/WMI" because of error 0x80041010. Events may not be delivered through this filter until the problem is corrected.

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Path Manager (Linux) Errors

Table 6-32. Path Manager (Linux) Errors

Problem	Cause and Solution
After SPS is installed and the OS is restarted, the SPS device (/dev/ddX) is not created.	1. Check that you are using supported HBAs. 2. Check the serial number of the disk array unit is configured correctly. 3. Check the disk array unit is recognized by the OS. Refer to the file "/proc/scsi/scsi" and check if "Vendor“ and “Model: DISK ARRAY” are shown. If the disk array unit is not recognized, they are not shown in the file. When they are not shown, check the FC cables are connected correctly. 4. Check SPS has been installed successfully. 5. Check the kernel version by running the command “uname -r" to ensure that the SPS that works with the supported kernel version is installed. If the problem persists even after checking and performing above mentioned, please contact the Support Service.
A configuration file of the SPS was created successfully but an error occurred when I/O was performed through the SPS device (/dev/ddX).	Check if "Not Ready" is generated in the system log. If "Not Ready" is generated, check the LUN state by using Storage Manger because the LUN of the disk array unit may be in "Not Ready" state. The LUN state may have been changed by a command from ControlCommandSet (such as ReplicationControl, SnapControl). Clear "Not Ready" state according to the device you are using. If the problem persists even after checking and performing above mentioned, please contact the Support Service.

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Table 6-32. Path Manager (Linux) Errors

Problem	Cause and Solution
When the OS is started, the message "Path Not Found" is displayed and accessing the SPS device fails.	Check the disk array unit is recognized by the OS. Refer to the file "/proc/scsi/scsi" and check if "Vendor: " and "Model: DISK ARRAY" are shown. If the disk array unit is not recognized, they are not shown. When they are not shown, check the FC cables are connected correctly. The SPS recognizes the path information at its first startup, and creates and retains the information in a status setting file. If correct connection to the disk array unit fails to be configured in the first OS startup after installation of SPS, it can cause incorrect path information to be recorded. In this case, delete the setting file recorded in the SPS, and then restart the OS. If the problem persists even after checking and performing above mentioned, please contact the Support Service.
SPS cannot be started when a certain RPM is updated.	Updating initscripts or iscsi-initiator-utils in a RHEL environment may disable the settings of automatic startup for SPS, and SPS may not be started automatically when the OS is started. Check /etc/rc.d/rc.sysinit to see the settings of automatic startup for SPS are configured. Run the following command and if there is no output, it indicates the settings of automatic startup for SPS are not configured. # grep mkdd /etc/rc.d/rc.sysinit If the settings of automatic startup for SPS have not been configured, configure them again and restart the OS. See the followings for setting automatic startup for SPS. # cd /etc/rc.d <Red Hat Enterprise Linux 5 (FC connection)> # patch -b -p0 < /opt/nec/sps/patch/rc.sysinit.rhel5.diff <Red Hat Enterprise Linux 5 (iSCSI connection)> # patch -b -p0 < /opt/nec/sps/patch/iscsi.rhel5.diff When you run the patch command but an error message is shown, it indicates the patch file is not applied correctly. In this case, add the line with "+" shown on the first row of the patch file to /etc/rc.d/rc.sysinit or /etc/rc.d/init.d/iscsi. If the problem persists even after checking and performing above mentioned, please contact the Support Service.

Changing Network Settings for Monitoring Disk Arrays from SnapSAN Manager

If a disk array cannot be monitored correctly from SnapSAN Manager due to faults occurring in performing initialization or erroneous settings, network settings must be changed.

Change disk array network settings using any of the following two procedures.

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Whether the disk array or management server must be changed is noted in the summary of each setting. Make changes after taking into account their effect on business.

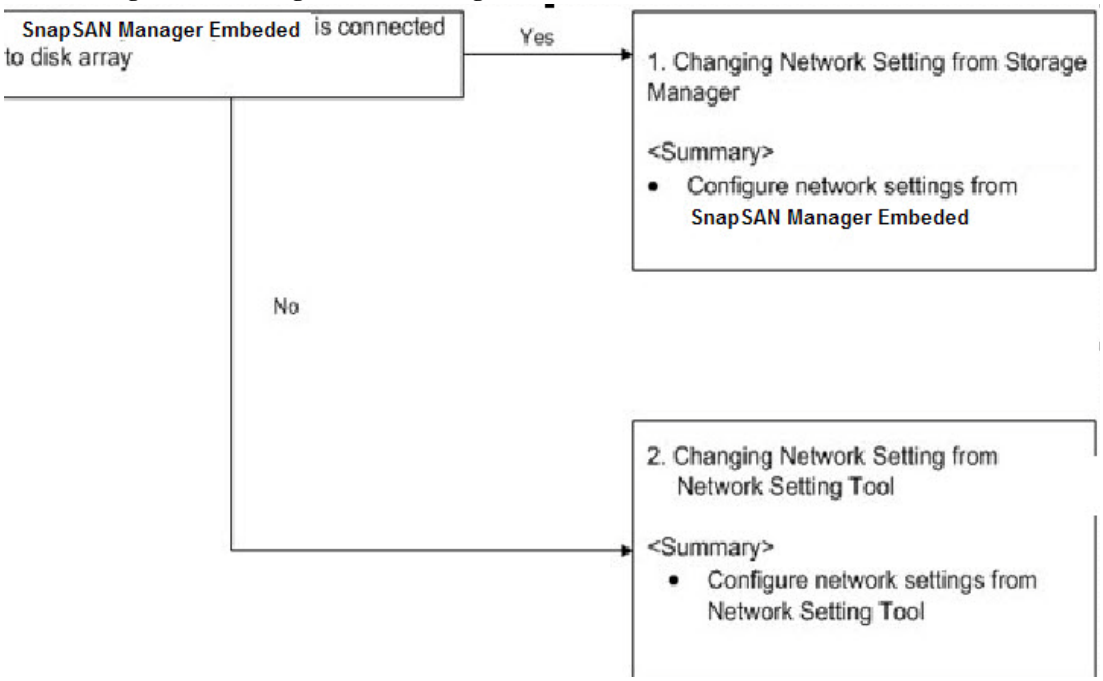
SnapSAN Manager Embeded is connected to disk array
Yes
1. Changing Network Setting from Storage Manager
<Summary>
Configure network settings from SnapSAN Manager Embeded
No
2. Changing Network Setting from Network Setting Tool
<Summary>
Configure network settings from Network Setting Tool

Figure 6-8: Network Setting Changing Flowchart

1. Changing Network Setting from SnapSAN Manager

   If the disk array is monitored from SnapSAN Manager, the disk array unit network settings can be changed from SnapSAN Manager.

   Make changes using [Configuration] - [Disk Array] - [Management Port Settings] from the menu. For details, refer to the *Storage Software Configuration Setting Tool User's Manual (GUI) for the SnapSAN S3000/S5000.*

2. Changing Network Setting from Network Setting Tool

   The disk array unit network settings can be changed from Network Setting Tool. For details, see *"Configuring IP Addresses by Using Network Setting Tool"*.

Troubleshooting at Installation

If the iSCSI port of the disk array cannot be set or the disk cannot be recognized by the host when installing the disk array, check the disk array settings following the procedure described below.

The IP Address of the iSCSI Port cannot be set on the SnapSAN Manager Initialization Wizard.

The same IP address cannot be set to multiple iSCSI ports in a disk array. If an IP address conflict occurred when setting an IP address, specify a unique IP address to each iSCSI port.

The logical disks of the disk array cannot be recognized by the host, or an error message is displayed

The following figure shows the confirmation procedure. First, execute ping to the iSCSI port of the disk array from the iSCSI port of the host (the appropriate NIC of software initiator), and check whether ping is successfully sent. For details about how to send ping, refer to the PING communication method of each OS.

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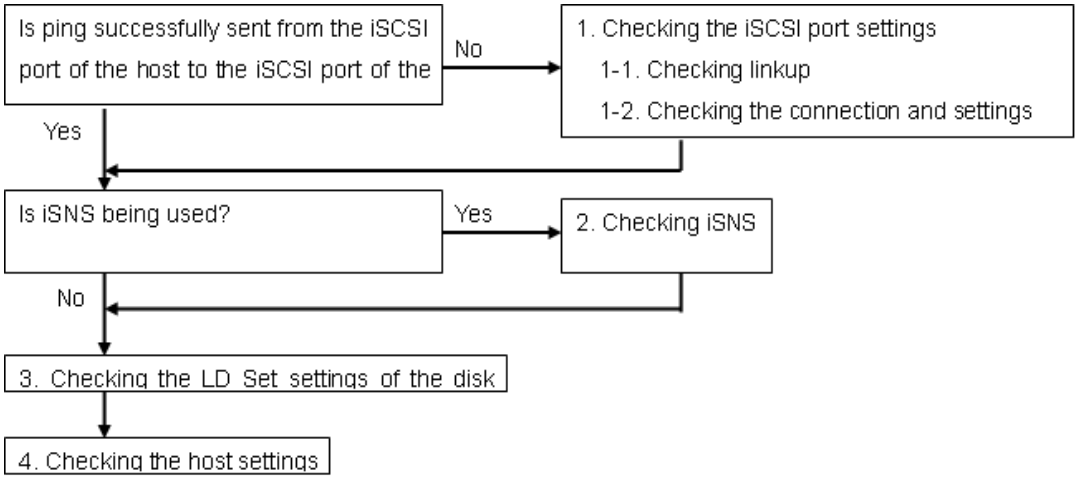
Is ping successfully sent from the iSCSI port of the host to the iSCSI port of the
No
1. Checking the iSCSI port settings
1-1. Checking linkup
1-2. Checking the connection and settings
Yes
Is iSNS being used?
Yes
2. Checking iSNS
No
3. Checking the LD Set settings of the disk
4. Checking the host settings

1. Checking the iSCSI port settings

If the disk array did not correspond to ping, check (1)-1 and (1)-2. After checking them, go to the steps described below:

- When using iSNS: (2) Checking iSNS
- When not using iSNS: (3) Checking the LD Set settings of the disk array

2. Checking linkup

Check the port to which the disk array and connected devices such as a host and switch are connected is correctly linkup.

Check method

The Link LED of the iSCSI port of the disk array is lit, the port is linkup. If the port is not linkup, check which of the following (a to c) is the LED status of the port.

NOTE: When the Ready LED of the controller is not blinking, the disk array is not online. Check the following when the disk array is online.

c. The Link LED and Active LED blink twice every two seconds
The iSCSI settings such as an IP address and subnet mask of the port have not been set, or they are invalid. Specify the iSCSI settings again by using the SnapSAN Manager initialization wizard. It is thought that Node Name (WWnn) of the disk array has not been set. If the LEDs are still blinking, after the iSCSI settings of the port have been correctly specified, check the Node Name of the disk array is correctly set.

d. The Link LED and Active LED blink once every two seconds
The port is offline. Check whether the disk array is being shut down.

e. The Link LED and Active LED are not lit
In the case of 10Gbps iSCSI, check whether the connected devices such as a host and switches support 10Gbps, or whether they are normally running.
In the case of 1Gbps iSCSI, the LEDs are not linkup when the link speed is not 1Gbps. Check whether the transfer rate of the connected devices such as a host and switches is 1Gbps, or whether they are normally running.
If the connected devices are normally running, check the cable connection.

3. Checking the connection and settings

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a. Checking the cable connection
Check whether the cable connection between the host and disk array, including switches is correct.

b. Checking the IP address and other settings of the connected devices
Check the IP address and subnet mask settings of the connected devices including the host. For the checking method, refer to the manual of the host.

c. Checking the connection devices such as switches
When the host and disk array are connected via a switch, check the switch settings. For the checking method, refer to the manual of the switch.

4. Checking iSNS

When iSNS is used and the disk array and host information cannot be applied to the iSNS server, check the following. When iSNS is not used, or the problem has been corrected, go to 3. “Checking the LD Set settings of the disk array”.

Check items

- Check whether the iSNS server-related connection between the host and disk array is correct.
- Check whether the iSNS server-related IP addresses of the host and disk array are correct, and whether the TCP port number is correct.

For how to change the iSNS settings of the disk array, refer to the manual of SnapSAN Manager.

NOTE: Be sure to specify the number of the following registered ports for the port number.

- iSCSI port: 3260 (The iSCSI port number of the disk array is defined to this number.)
- iSNS port: 3205 (Specify the iSNS port number from SnapSAN Manager.)

5. Checking the LD Set settings of the disk array

Check the Access Control and CHAP authentication settings of the disk array. After checking and changing the settings, go to 4. “Checking the host settings”.

LD Set log collection method

After collecting the LD Set information by using SnapSAN Manager, check the settings below. For how to collect the LD Set information, refer to the manual of SnapSAN Manager.

6. Checking the settings related to Access Control

a. Check that the initiator name set to the LD Set is the same as that of the host.

b. Check that the IP address of the iSCSI port of the disk array, which has been set to the LD Set, is correct.

c. Check that the logical disks assigned to the host as an LD Set is correct.

7. Checking the CHAP authentication settings

Check whether CHAP is enabled or disabled by referring to the CHAP authentication / bidirectional CHAP authentication settings of the initiator (host) and SnapSAN Manager.

For how to change the settings of SnapSAN Manager, refer to the manual of SnapSAN Manager.

8. Checking the host settings

Check the following iSCSI settings of the host.

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9. Checking the iSCSI parameter settings of the host

   Check that the iSCSI settings of the host, including the initiator name, CHAP, and target portal, are correct.

If the port number can be selected for the target specification settings of iSCSI initiator, including an IP address and subnet mask, use the default port number (3260).

10. Checking the multi-session settings of the host

    Check that the login setting of the host is not set to multi-session. For how to check the login setting, refer to the manual of the host (software initiator).

    Multi-session

    If logging in to the same IP address (iSCSI port) of the disk array twice from the hosts with the same name, the first login connection is disconnected.

    Example: In the case of iSCSI Initiator on Windows Server 2003, if the same target is specified to Persistent Targets twice or more

    If the Automatically restore this connection when the system boots check box is selected at login, the target is registered to the Persistent Targets tab of the Microsoft iSCSI Initiator dialog box.

    If the same target logs in to the disk array twice or more by specifying the same IP address, the duplicated list is set to Persistent Targets, and the system enters a multi-session. If a duplicated Target-IPaddress pair exists in Persistent Targets, delete the duplicated pair.

    For details, refer to the manual of Microsoft iSCSI Initiator.

11. Checking whether the host logged in target on the disk array

    Check whether the host is logging in the target on the disk array. For how to check, refer to the manual of the host (software initiator). If the host is not logging in the target, check whether the host is set to log in the target on the disk array.

    For iSCSI Initiator software, it is possible to specify whether to automatically reconnect to the host after rebooting the host. If the logical disk cannot recognized after rebooting the host, check whether the automatic recognition settings are appropriate.

12. When the error cause cannot be identified

    Prepare the items described in *"Before You Call"*, and then contact sales, the sales agent from whom you purchased the disk array unit, or your maintenance service agent.

User Support

Unit Life Span and Maintenance Period

The unit life span and maintenance periods after production ends for the disk array unit are as follows.

Parts used in the disk array unit include parts that must be replaced due to their life spans (such as cooling fans, batteries, and disk drives).

Since life spans may be shorter than five years depending on the environment in which the disk array unit is used, it is recommended that parts be replaced regularly. Contact your maintenance service agent regarding replacements and life spans.

- Unit life span: 5 years
- Maintenance period: 5 years after production ends

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NOTE: Note that repair may not be possible in the cases below. Moreover, a fee may be charged even if within the warranty period.

- Stained goods, dropped goods, goods damaged by mishandling
- Goods damaged by mishandling in storage or shipping
- Items altered by the user
- Items whose life spans are over
- Goods damaged by earthquake, lightning, fire, or other natural disaster, and goods damaged due to an accident or other external cause

Life Spans of Parts

- Fan (power supply): 50,000 hours
- Disk drive: 5 years

Battery

The battery life span becomes shorter when it is used in high temperatures environments.The life span is about 5 years when used under an ambient temperature of 25 degree celsius(77°F), but will be reduced to approximately half (about 2.5 years) at an ambient temperature of 35 degree celsius(95°F). In addition, as backup frequency increases, the battery life span becomes shorter. The life span above is calculated considering accidental power disconnection such as power outage.

Before You Call

Before you call to clarify your queries or consult on a failure or abnormality of a disk array unit, the following items should be available.

- The warranty and this user guide.
- Conditions of the fault or abnormality, notes on content of questions.
- Notes on the unit configuration and software used on it.
- Notes on the configuration of the connection of the host unit to the disk array unit and the configuration of peripheral equipment connected to the host unit.
- Manuals for the host unit and peripheral equipment connected to the host unit and manuals of software used.

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Troubleshooting Information Sheet

1. Write down the model and serial number of the disk array unit. You can find them on the nameplate.

   MODEL: _____

   SER.NO: _____

2. Confirm the following.

   Number of installed drive enclosures: _____

   Number of installed disks: _____

3. Do you use UPS? What model?

   _____

4. Do you use a power coupling unit or PMAN? What model?

   _____

5. Are the following LEDs of the controller enclosure on?

   Yes/No/Blinking

6. Are the following LEDs of the drive enclosure on?

   Yes/No/Blinking

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Contacts for Questions and Consultation

For questions and consultation about the disk array unit, contact SnapSAN Manager sales, the sales agent from whom you purchased it, or your maintenance service agent.

Configuration Sheet

For your convenience please complete this form and keep it as a handy reference.

1. Please write down the model and serial number of your SnapSAN product.
   Model No. _____
   Serial No. _____
2. Please note the following:
   a. Controller type:
   i. iSCSI____
   ii. Fibre____
   iii. Combo____
   iv. SAS____
   b. Number of Controllers:
   c. Serial number of Controllers:
   i._____
   ii._____
   d. Number of expansion enclosures: _____
   e. Disk type(s):
   i. SAS Number/Capacity
   1.3.5"_____/_____
   2.2.5"_____/_____
   ii. SSD
   1.2.5"_____/_____
3. Do you have the unit(s) on a UPS?
   a. Model:_____
   b. Firmware Revision:_____

For technical support with your SnapSAN please see us at:

http://support.overlandstorage.com/support/contact.htm

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Modifying the Configuration with SnapSAN Manager (FC/SAS/iSCSI)

This section provides information on modifying the configuration of an FC or SAS, and iSCSI, connected disk array using SnapSAN Manager.This chapter describes how to change the settings of a disk array controller after the disk array controller is started.

The SnapSAN S3000/S5000 does not require modification of the settings by using DIP switches.

IMPORTANT: Do not change the configuration of the DIP switches located on the surface of the controller.

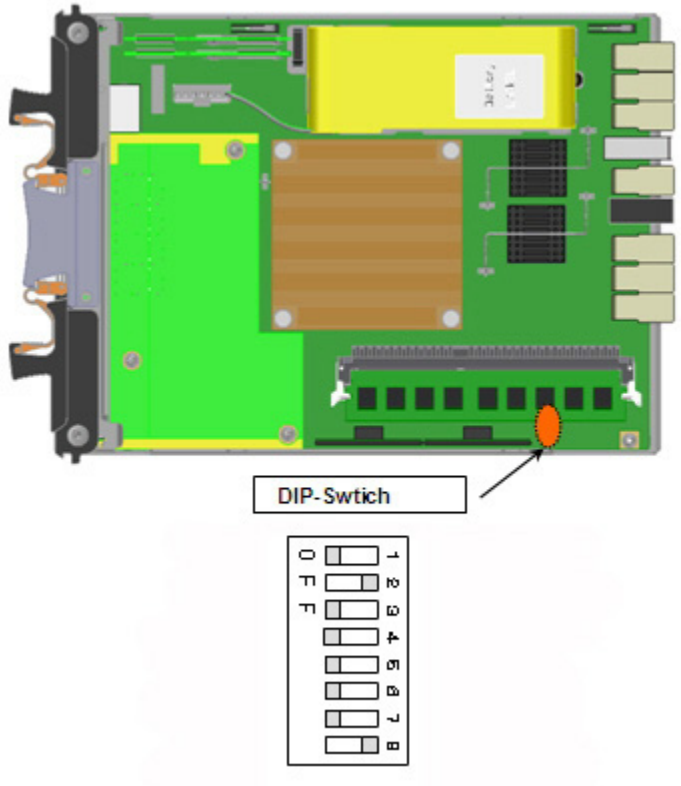

Figure 6-9: DIP Switch

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Specifications

The specifications of the disk array are shown below.

Table A-1: Specifications - Disk Array

	SnapSAN 3000	SnapSAN 5000
Host interface	(A) Fibre channel (FC-AL / Fabric): • Maximum transfer rate: 8 Gbps (B) iSCSI: • Maximum transfer rate: 1 Gbps • Maximum transfer rate: 10 Gbps (Fibre)	(A) Fibre channel (FC-AL / Fabric): • Maximum transfer rate: 8 Gbps (B) iSCSI: • Maximum transfer rate: 1 Gbps Maximum transfer rate: 10 Gbps (Fibre)
CONTnumber per unit	2	2
Number of host ports per CONT	(A) 4	(A) 4
	(B) 2	(B) 2
Cache memory capacity per unit	8 GB	8GB (initial) 16 GB (when memory added)
Backup time for cache memory	Unlimited	Unlimited
DEs per unit	3.5-inch DE: Max. 7 2.5-inch DE: Max. 3	3.5-inch DE: Max. 7 2.5-inch DE: Max. 5
Number of disk drives	3 to 96	3.5-inch disk drive: 3 to 96 2.5-inch disk drive: 3 to 144
Disk drive	3.5-inch SAS (15Krpm): 300 GB, 450 GB, 600 GB (standard), 600 GB (encryption) 3.5-inch NL-SAS (7.2Krpm): 1 TB, 2 TB 3.5-inch SSD: 400 GB 2.5-inch SAS (10Krpm): 300 GB, 450 GB, 600 GB (standard), 600 GB (encryption) 2.5-inch NL-SAS (7.2Krpm): 1 TB 2.5-inch SSD: 10 0GBß	3.5-inch SAS (15Krpm): 300 GB, 450 GB, 600 GB (standard), 600 GB (encryption) 3.5-inch NL-SAS (7.2Krpm): 1 TB, 2 TB 3.5-inch SSD: 400 GB 2.5-inch SAS (10Krpm): 300 GB, 450 GB, 600 GB (standard), 600 GB (encryption) 2.5-inch NL-SAS (7.2Krpm): 1 TB 2.5-inch SSD: 10 0GBß
Disk interface	SAS: Maximum transfer rate: 6 Gbps	SAS: Maximum transfer rate: 6 Gbps
RAID type	RAID-10, 50, 60, TM	RAID-10, 50, 60, TM

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Specifications of the RAID configurations are shown below.

Table A-1: Specifications - RAID Configurations

RAID type	RAID components	Number of disk drives	Storage efficiency
RAID-10	(1D+1D)× n	2 or more	50%
RAID-50	(2D+P)× n	3 or more	66%
	(4D+P)× n	5 or more	80%
	(8D+P)× n	9 or more	88%
RAID-60	(4D+PQ)× n	6 or more	66%
	(8D+PQ)× n	10 or more	80%
RAID-TM	1D+1D+1D	3	33%

IMPORTANT: It is recommended that you use disk drives of the same capacity and rotational frequency for RAID systems. D refers to data disk; P and Q refer to parity disks where n is an integer greater than 1.

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Appendix B Windows FC/SAS Application Server

This appendix provides the steps you should follow while setting or checking application server in the Windows environment, when the disk array is configured for a FC or SAS connection.

Installing SnapSAN Manager Agent Utility

The following functions become available by installing the SnapSAN Manager Agent Utility.

- iSM Volume List Command.
- Host agent (Host information collection command and host agent service) (*1)
- iSCSI Setup Tool (*2)
- SnapSAN Host Register Agent (*3)

*1 Available in Windows Server 2003 SP 1 or later environments.
*2 Available in Windows Server 2008 or later environments.
*3 Available in Windows Server 2003 or later environments.

Operating System and Environments

Microsoft Windows Server 2003, Standard Edition (SP0 to SP2) (*1)
Microsoft Windows Server 2003 R2, Standard Edition (SP0, SP2)
Microsoft Windows Server 2003, Standard x64 Edition (SP0, SP2)
Microsoft Windows Server 2003 R2, Standard x64 Edition (SP0, SP2)
Microsoft Windows Server 2003, Enterprise Edition (SP0 to SP2) (*1)
Microsoft Windows Server 2003 R2, Enterprise Edition (SP0, SP2)
Microsoft Windows Server 2003, Enterprise x64 Edition (SP0, SP2)
Microsoft Windows Server 2003 R2, Enterprise x64 Edition (SP0, SP2)
Microsoft Windows Server 2003, Enterprise Edition for TItanium-based Systems (SP0 to SP2) (*1) (*5)
Microsoft Windows Server 2008 Standard (SP0, SP2) (*2) (*3) (*4)
Microsoft Windows Server 2008 R2 Standard (SP0, SP1) (*2) (*4)
Microsoft Windows Server 2008 Enterprise (SP0, SP2) (*2) (*3) (*4)
Microsoft Windows Server 2008 R2 Standard (SP0, SP1) (*2) (*4)
Microsoft Windows Server 2008 for Itanium-based Systems (SP0, SP2) (*5)

(*1) To use the host information collection function included in SnapSAN Manager Agent Utility, SP1 or SP2 must be applied on this OS.
(*2) The product without Hyper-V function is also supported.
(*3) The Server Core install option is not supported.
(*4) The iSCSI Setup Tool (sharing function) can be used on the SnapSAN 5000 disk arrays. This tool supports Windows Server 2008 or later. The 32-bit version of Java Runtime Environment (JRE) must be installed to use this function.

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(*5) The SnapSAN 5000 does not support Microsoft Windows Server 2003, Enterprise Edition for Itanium-based Systems, and Microsoft Windows Server 2008 for Itanium-based Systems.

Memory

Microsoft Windows Server 2003, Standard Edition

OS required memory + 10 MB or more

Microsoft Windows Server 2003 R2, Standard Edition

OS required memory + 10 MB or more

Microsoft Windows Server 2003, Standard x64 Edition

OS required memory + 12 MB or more

Microsoft Windows Server 2003 R2, Standard x64 Edition

OS required memory + 12 MB or more

Microsoft Windows Server 2003, Enterprise Edition

OS required memory + 10 MB or more

Microsoft Windows Server 2003 R2, Enterprise Edition

OS required memory + 10 MB or more

Microsoft Windows Server 2003, Enterprise x64 Edition

OS required memory + 12 MB or more

Microsoft Windows Server 2003 R2, Enterprise x64 Edition

OS required memory + 12 MB or more

Microsoft Windows Server 2003, Enterprise Edition for Itanium-based Systems

OS required memory + 37 MB or more

Microsoft Windows Server 2008 Standard

OS required memory + 10 MB or more

Microsoft Windows Server 2008 Enterprise

OS required memory + 10 MB or more

Microsoft Windows Server 2008 for Itanium-based Systems

OS required memory + 37 MB or more

* Above are the supported environments for this version at the point of the initial shipment of this product.

Installation

Use SnapSAN Manager Setup to install the SnapSAN Manager Agent Utility.

SnapSAN Manager Setup starts automatically when the SnapSAN S3000/S5000 Documentation Software CD is inserted.

SnapSAN Manager Setup Procedure:

1. Logon as administrator.
2. Insert the CD-ROM of SnapSAN Manager in an application server.
3. The SnapSAN Manager Setup starts automatically. Perform the installation as prompted.

The SnapSAN Manager Setup may not start automatically depending on your system configuration, in which case, start the following program contained in the CD-ROM:

`\INSTALL\WINDOWS\ISMSETUP.EXE`

CAUTION: After the SnapSAN Manager Agent Utility is installed, the system needs to be restarted to start the SnapSAN Manager host agent service.

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Collecting/Registering Host Information on Application Server - Windows

NOTE: The procedure described below is not supported by the disk arrays connected via SAS.

Collecting Host Information by Using File Output - Windows

To collect host information by using file output, follow the procedure below.

1. Run the host information collection command (`iSMcc_hostinfo`) from the command prompt.
   a. For the `-export` option, specify a file (host information file) to which host information will be reported.
   b. Run the host information collection command (`iSMcc_hostinfo`) as a user privileged as Administrator.

   D:\> iSMcc_hostinfo -export \ServerName
   iSMcc_hostinfo: Info: iSM11700: Please wait a minute.
   iSMcc_hostinfo: Info: iSM11770: Host Information was exported successfully. (code=
   aaaa-bbbb-bbbb-bbbb)
   iSMcc_hostinfo: Info: iSM11100: Command has completed successfully.
2. Confirm the that the message No. iSM11770 is reported and the host information is successfully collected. "aaaa" in the message example above is replaced with a process number and "bbbb" with an internal code for maintenance in the actual message.
3. Transfer the host information file reported by using the host information collection command (`iSMcc_hostinfo`) to a client by using file transfer, USB memory, or other methods.

Registering Host Information by Using File Output

To register host information by using file output, follow the procedure below.

1. Report a host information file.
2. Transfer the host information file to a client.

   Tip: *Use file transfer, USB memory or other methods to transfer the host information file to a client.*
3. Register the host information by using SnapSAN Manager. Click **Configuration**, **Host** and **Host Information Collection** to open the Host Information Registration window.
4. Select **host information setting method**.
5. Select the **Update with host information file. (Windows, Linux or Hyper-V)** option and click **Next**.
6. Specify the host information file.
   a. Click **Show collected information** to specify the file in which the host information is recorded and click **Add**.
   b. Confirm that all the host information is retrieved and click **Next**.

   This displays the Host information collection completion window.The result of setting host information is displayed.

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7. Click **Finish** to close the page.

Check Connection from Application Server - Windows Environment

1. After confirming that the application server and disk array controller are connected through an FC cable, restart the server and perform the following checks.
2. To start, select **Administrative Tools > Computer Management > Device Manager**.
3. Click **Disk drives** and check the number of logical disks.

Display example: When four logical disks are assigned to a server.

NOTE: If nothing is displayed, the OS was unable to recognize logical disks in the disk array assigned to a server. Check the connection between the server and disk array controller, the Access Control settings, host bus adapter driver settings, etc.

4. Open **Disk Management** and check the number of logical disks assigned to a server.

Check the Path Manager Settings and Status

When Path Manager is not used, it is not necessary to perform this step.

- After checking the FC cable connection between the application server and disk array controller, restart the server and run the following command from the command prompt.

IMPORTANT: For details, refer to the *Path Manager User's Guide (Windows Version)*.

Check Path Manager status

Run the following command from the command prompt.

```
spsadmin /lun
```

Check the message shown after the command is executed, and then check the number of logical disks assigned to the server, the number of access paths per logical disk, and each path status.

Display example: When two logical disks are assigned to a server, with two access paths per logical disk.

```
C:\>spsadmin /lun

+++ LogicalUnit #0 +++
 SerialNumber="0000000995000001", LDNumber=0x00000
 LoadBalance=Least Size
 0: ScsiAddress=2:0:0:0, Priority=1, Status=Active
 1: ScsiAddress=3:0:0:0, Priority=2, Status=Standby

+++ LogicalUnit #1 +++
 SerialNumber="0000000995000001", LDNumber=0x00001
 LoadBalance=Least Size
 0: ScsiAddress=2:0:0:1, Priority=1, Status=Active
 1: ScsiAddress=3:0:0:1, Priority=2, Status=Standby
```


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CAUTION: If nothing is displayed, none of the access paths recognized the logical disks of the disk array controller assigned to the application server. Check the connection between the application server and the disk array controller, the Access Control settings, host bus adapter driver settings, and other settings.

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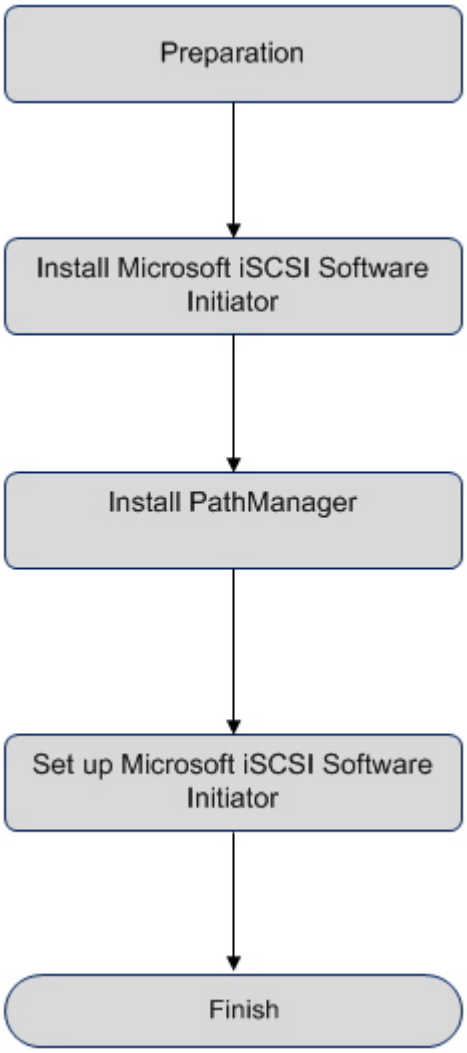
Windows iSCSI Host Server

Initializing Host Server

Perform the following steps to initialize the application server in a Windows environment.

Table C-1: Host Server Initialization

Process Flow	Description
	Preparation for installation. Installing iSCSI Software Initiator. If Microsoft iSCSI Software Initiator has already been installed, skip this step. Installing Path Manager When Path Manager will not be used, this step is not necessary. This describes how to set up Microsoft iSCSI Software Initiator. Installing Path Manager .

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Preparation

Perform the following steps to prepare for installation of application server in Windows environment:

1. Must have the Host Servers IP address available.

Prepare IP addresses to be assigned to the application server as many as the NIC (1000BASE-T or 10GBASE-SR) ports. In addition, prepare the subnet mask and gateway addresses.

CAUTION: If two or more IP addresses are used by Path Manager, the same network segment cannot be specified. Prepare IP addresses of other segments.

Example 1: Connectable configuration
HP0:192.168.0.10
HP1:192.168.1.10

Example 2: Unconnectable configuration
HP0:192.168.0.10
HP1:192.168.0.11

2. Attach NIC (1000BASE-T or 10GBASE-SR).

Attach the NIC to the application server as described in the manuals provided with the NIC and application server.

NOTE: Skip this step, if the NIC has already been attached to the application server.

3. Install the NIC (1000BASE-T or 10GBASE-SR) driver.

Install and set up the driver according to the setup procedure in the manual provided with the NIC equipped in the server, or by referencing information provided on the Web, etc.

NOTE: Skip this step, If the driver has already been installed and set up for the NIC equipped in the application server.

4. Specify the network settings.

Select **Start > Control Panel > Network Connection**, and then open **Local Area Connection Properties** to specify the IP address, subnet mask, and default gateway.

5. Connect to the disk array controller.

Use a 10-Gbps or 1-Gbps cable to connect the application server to the host port (HP connector) of the disk array controller.

- Unit equipped with 10Gbps iSCSI 2port controllers 10-Gbps cable

  Connector shape: LC connector

NOTE: FC cable can be used.

- Unit equipped with 1Gbps iSCSI 2port controllers 1-Gbps cable

  Connector shape: RJ-45 connector

  NOTE: CAT6 LAN cable is recommended.Either straight cable or crossover cable can be used.

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The following shows the positions of the host ports.

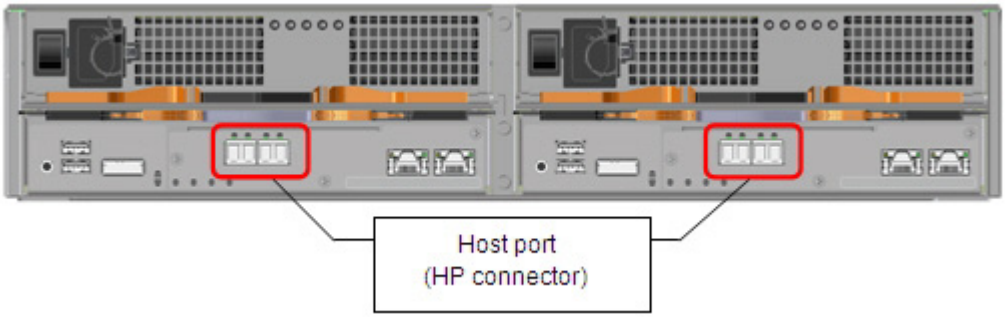

Figure C-1: Unit with 10Gbps iSCSI 2port Controllers

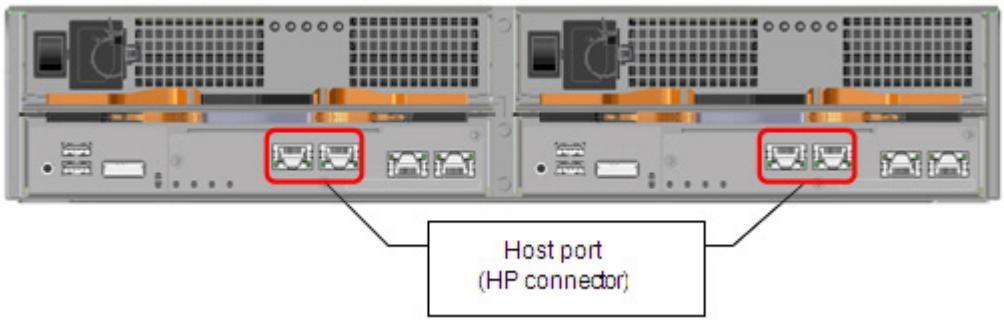

Figure C-2: Unit with 1Gbps iSCSI 2port Controllers

The following shows an example of a 10-Gbps iSCSI connection (redundant path configuration in combination with Path Manager).To implement the recommended example, two NICs must be installed in the application server and two 10-Gbps cables are needed to connect the disk array controller and NICs.

Use a 10-Gbps cable to connect the NIC to the host port (HP connector) of the disk array controller. (The 10-Gbps cable has the same connector shape on both ends.)

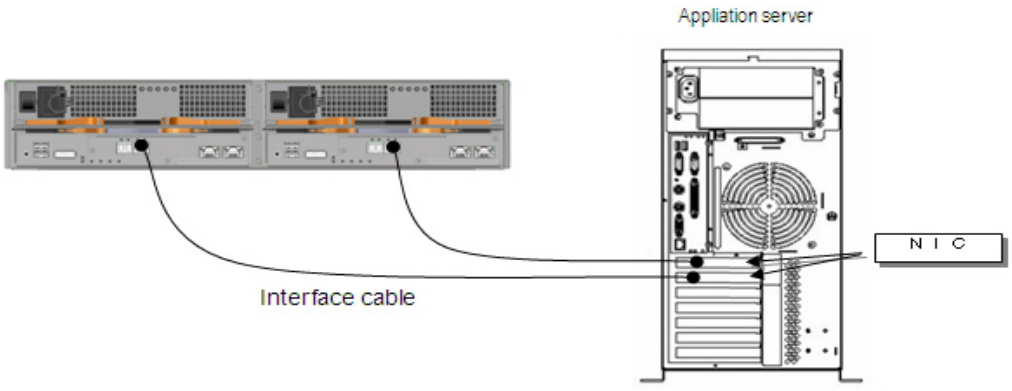

Figure C-3: Configuration Example

Installing iSCSI Software Initiator

Perform the following steps to install iSCSI Software Initiator in Windows Server 2008 or Windows Server 2003 environments:

Windows Server 2008

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Windows Server 2008 has the iSCSI Software Initiator already installed, so there are no installation steps. Follow the procedure:

1. Select **Start** > **Administrative Tools**, and then start iSCSI Initiator. Dialog boxes are displayed only during initial startup.
2. After the service is started, if there are no problems with the firewall settings, click the **Yes** button in each screen.

Windows Server 2003/Windows Server 2003 R2

Perform the following steps to install the initiator in Windows Server 2003 or Windows Server 2003 R2 environment:

1. Download the Microsoft iSCSI Software Initiator from the Microsoft website (*http://www.microsoft.com/downloads/*).
2. The following screen is displayed when installation of the Microsoft iSCSI Software Initiator begins.
3. Click the **Next** button.
4. Change the settings as follows:
   - Select the **Initiator Service** option.
   - Select the **Software Initiator** option.
   - Deselect the **Microsoft MPIO Multipathing Support for iSCSI** option.
5. Click the **Next** button.

NOTE: When Path Manager is being used, the MPIO function cannot be used.

6. If you agree to the terms of the license agreement, select **I Agree**, and then click the **Next** button.
7. A dialog box appears. No additional user input is needed until installation is completed.
8. Click the **Finish** button to restart the server.
9. After the server is restarted, the Microsoft iSCSI Initiator icon appears on the desktop.

Installing Path Manager

See "Windows Application Server" for installation procedure.

This operation is not necessary if you do not install Path Manager.

CAUTION: When using Path Manager, MPIO function of the iSCSI Software Initiator cannot be used. If the iSCSI Software Initiator has already been installed and MPIO function is set to enabled, you must uninstall the iSCSI Software Initiator. Then reinstall the iSCSI Software Initiator with the setting not using MPIO function.

Setting up iSCSI Software Initiator

Settings for the Windows Server 2008 environment are described below.

1. Select the **General** tab in the iSCSI Initiator Properties screen to check the iqn (iSCSI Qualified Name) shown as the Initiator name.
   - Click the **Change** button to change the iqn.
   - Click the **Secret** button when using the mutual CHAP authentication.

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- Click the **Setup** button when using the IPSec tunnel mode function. This is not supported.

CAUTION: The **Secret** setting for mutual CHAP authentication must also be set for the disk array controller. The setting method is described in *iSMcfgsetIdsetchap of SnapSAN ManagerCommand Reference*.

Mutual CHAP authentication is also described in *SnapSAN Manager Command Line Interface Reference Guide* as **Bidirectional CHAP authentication**.

CHAP authentication is also described in *"CHAP Authentication"*

---

2. If mutual CHAP authentication:

- will be used, click the **Secret** button
- will not be used, skip step (3) and move to step (4) below.Under **CHAP Secret**, enter the password assigned to Initiator for use in mutual CHAP authentication, and then click the **OK** button.

CAUTION:
The CHAP Secret can be specified as any string of 12 to 16 alphanumeric characters as well as !#$%&'*+~/=?{|}_.-. Letters are case-sensitive. For security, password text strings are indicated as ● or other symbols.

Mutual CHAP authentication is also described in *SnapSAN Manager Command Reference* as **Bidirectional CHAP authentication**.

The CHAP Secret that is set here is a password that a target uses to authenticate the Initiator. This password is also required for settings on the disk array side (see *iSMcfg setIdsetchap in the SnapSAN Manager Command Reference*), so be sure to write it down so it is not forgotten.

---

3. Perform the iSCSI Initiator Properties Discovery tab settings using any of the following options:
   - Settings when not using iSNS (Internet Storage Name Service) server
   - Settings when using the iSNS (Internet Storage Name Service) server

1

4. Perform the following settings:
   a. Under the **Discovery** tab in **iSCSI Initiator Properties**, click the **Add Portal** button under **Target Portal.** Enter the IP address of the disk array host port (iSCSI port) under **IP address or DNS name**. Make sure the entry is correct, and then click the **OK** button.

   NOTE: Do not change the Port setting 3260.

   b. The following pop-up window may appear, but it does not affect operations.
   c. Click the **OK** button.
   d. To make the host port (iSCSI port) on the disk array of a redundant configuration, perform steps (a) to (c) above for each additional host port.
5. When settings are completed, a screen is displayed. Click the **OK** button.

Example: When two Target Portal IP addresses have been registered.

Settings when using iSNS (Internet Storage Name Service) server

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CAUTION: Microsoft iSNS Server must be installed in a Windows server on the same network as the application server.

For detailed description of iSNS server, refer to manuals and other documents provided separately from Microsoft Corporation

Perform the following settings:

a. Under the Discovery tab in **iSCSI Initiator Properties**, click the **Add** button. Enter the IP address of the iSNS server under **IP address or DNS name of server**.

b. Verify that the entry is correct, and then click the **OK** button.

c. Repeat steps (a) and (b) above for each iSNS server IP address to be registered. When settings are completed, a screen is displayed. Click the **OK** button.

Example: When two iSNS server IP addresses are registered.

d. This gets Initiator information from the application server registered to the iSNS server.

NOTE: When using the iSNS server, the Initiator name of the application server must be directly entered under the Initiator settings in the iSCSI Setup Tool.

e. Click the **OK** button.

iSCSI Setup Tool

Run the iSCSI Setup Tool on the application servers to configure the iSCSI settings required for the application server. Before starting this section, you need to install SnapSAN Manager Agent Utility. For install installation instructions, see "Installing SnapSAN Manager Agent Utility".

1. Click **Start > SnapSAN Manager Agent Utility > iSCSI Setup Tool** to start iSCSI Setup Tool.
2. Select the serial number of the target disk array controller from the **Serial number** box.
3. After selecting or entering the serial number, click **OK**.

   During data collection process, the disk array controller information is successfully completed. The serial number, controllers, IP addresses of the disk array controller and their connection statuses are displayed.
4. Select a target IP address from the list and configure the required settings. You can select multiple target IP addresses. When you want to select multiple target IP addresses, select the **Multi Path** check box.
5. After the required information is entered, click **Logon**.
6. When logging on to the target disk array is successfully complete, the message "Logon Succeeded." appears. Clicking **OK** brings you back to the logon page of the target, so click **Close** to end iSCSI Setup Tool.

CAUTION: iSCSI Setup Tool uses Java. It is necessary to install Java Runtime Environment (32-bit version) to the operation server.

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Criteria

The host name should be 15 bytes or less.

An error may occur and an invalid LD set may be recorded when you complete logon and retry to logon to a disk array system with the same serial number. In this case, delete the invalid LD set using SnapSAN Manager.

An application server must be connected to both a) the network connected with a management port of a target disk array and b) the network connected with a host connection port.

When using SnapSAN Manager (SnapSAN Manager Embedded), use the iSCSI Setup Tool in the state which doesn't hold a configuration setting screen of SnapSAN Manager.

Use the iSCSI Setup Tool in the state in which a LD set with the iqn of the same application server does not exist in the target disk array.

After setting an IP address in a host connection port or changing it, the iSCSI Setup Tool may become in an Error State. Re-execute the iSCSI Setup Tool in that case.

Checking Connection from Application Server

Perform the following steps to connect the application server and disk array in Windows environments.

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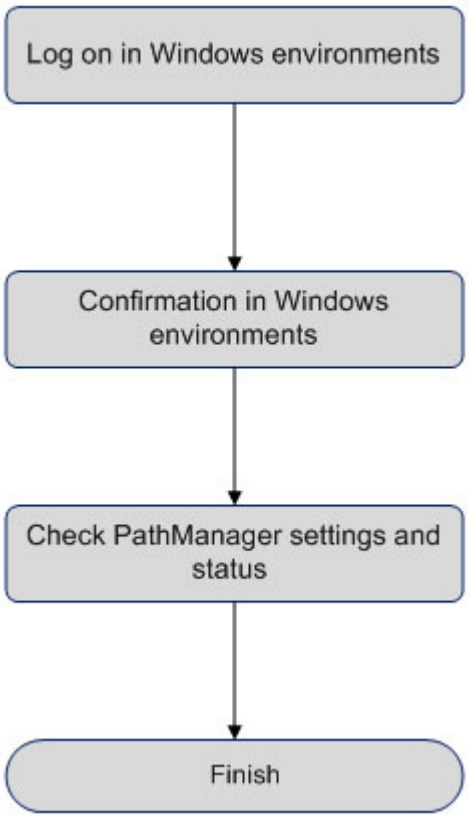

Log on to the target.

For details, refer to "Logon Steps in Windows Environments"

Confirm that the OS recognizes the logical disk.

Check Path Manager settings and status.

For details, refer to "Check the Path Manager Settings and Status".

If Path Manager will not be used, this step is not necessary.

Logon Steps in Windows Environments

Perform the following steps to logon to the target in the windows environment:

1. Click the **Refresh** under the **Targets** tab in **iSCSI Initiator Properties**. The Initiator name (iqn) of the disk array controller will be shown under **Targets**. Select an iqn and click the **Log on** button.
2. Change the following settings:
   a. Select the **Automatically restore this connection when the system boots** option.
   b. Do not select the **Enable muti-path** option.
   c. When finished, click the **Advanced** button.
3. Change the following settings:

Connection Settings

a. Select the **Microsoft iSCSI Initiator** option from the **Local Adapter** drop-down menu.
b. Select the IP address of the local server from the **Source IP** drop-down menu.
c. Select the IP address of the disk array host port (iSCSI port) from the **Target Portal** drop-down menu.

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CHAP Authentication Settings

a. Select the **CHAP logon information** option.

b. Enter password to be assigned to target in the **Target Secret** box.

c. Select **Execute mutual CHAP** option when using mutual CHAP authentication.

d. Click the OK button.

⚠ CAUTION: The CHAP Secret can be specified as any string of 12 to 16 alphanumeric characters as well as !#$%&'*+~/=?{|}_-. Letters are case-sensitive. For security, password text strings are indicated as dots or other symbols.
Mutual CHAP authentication is also described in *SnapSAN Manager Command Line Interface Reference Guide* as **Bidirectional CHAP authentication**.

For description of CHAP authentication, refer to *"CHAP"*
The Target Secret that is set here is a password that a target uses to authenticate an Initiator. This password is also required for settings on the disk array side (see *iSMcfg setIdsetchap in the SnapSAN Manager Command Line Interface Reference*), so be sure to write it down so it is not forgotten.

---

4. Click the **OK** button.

   Perform the following steps:

5. Select iqn of target.

6. Delete the selected iqn.

7. Check that the iqn status of the target disk array controller is shown as **Connected** (transition from inactive).

- Click the Log On button. When adding registration of host port (iSCSI port) for the disk array (redundant configuration).
- Click the **OK** button. When not adding registration of host port (iSCSI port) for the disk array (non-redundant configuration)

This completes the operations.

Adding Host Port Registration

1. Change the following settings: When finished, click the **Advanced** button.

   a. Select the **Automatically restore this connection when the system boots** option.

   b. Select the **Enable multi-path** option.

   c. Under the settings for the newly registered disk array host port, select the Enable multi-path option.

   d. When finished, click the **Advanced** button.

When registering additional host port

1. Change the following settings:

Connection Settings

a. Select the Microsoft iSCSI Initiator option from the Local Adapter drop-down menu.

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b. Select the IP address of the local server from the Source IP drop-down menu.

c. Select the IP address of the disk array host port (iSCSI port) from the Target Portal drop-down menu.

CHAP Authentication Settings

a. Select the **CHAP logon information** option.

b. Enter password to be assigned to target in the **Target Secret** box.

c. Select **Execute mutual CHAP** option when using mutual CHAP authentication.

⚠ CAUTION: The CHAP Secret can be specified as any string of 12 to 16 alphanumeric characters as well as !#$%&'*+~/=?{|}_-. Letters are case-sensitive. For security, password text strings are indicated as dots or other symbols.

Mutual CHAP authentication is also described in SnapSAN Manager Embedded as **Bidirectional CHAP authentication**.

NOTE: For description of CHAP authentication, refer to *"CHAP Authentication"*

⚠ CAUTION: The Target Secret that is set here is a password that a target uses to authenticate an Initiator. This password is also required for settings on the disk array side (see *iSMcfg setIdsetchap in the SnapSAN Manager Command Reference*), so be sure to write it down so it is not forgotten.

Additional host port registration

1. Click the **OK** button.
2. Log On to Target Screen
3. To register additional disk array host ports, click the **Log On** button, and then perform steps (6) to (8) for each port to be registered.
4. After the host port settings have been registered, click the **OK** button.

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Appendix D

Linux FC/SAS Application Server

This appendix provides the steps you should follow while setting or checking the application server in the Linux environment when the disk array is configured for the FC connection.

Installing SnapSAN Manager Agent Utility

The following functions become available by installing the SnapSAN Manager Agent Utility.

- iSM volume list command
- Host agent (Host agent service)
- iSCSI Setup Tool
- SnapSAN Manager Host Register Agent

Table D-1: Operating Environment (Linux)

Item	Supported Environment
Operating systems	Red Hat Enterprise Linux Version 5 (*1) • Red Hat Enterprise Linux 5.5 to 5.7 (IA32/EM64T) • Red Hat Enterprise Linux 5.5 to 5.7 Advanced Platform (IA32/EM64T) Red Hat Enterprise Linux Version 6 • Red Hat Enterprise Linux 6.1 (IA32/EMT64) SUSE Linux Enterprise Server10 • SUSE Linux Enterprise 10 SP3 (IA32/EM64T) (*2) (*1) The iSCSI Setup Tool (sharing function) supports Red Had Enterprise Linux 5.5 (IA32, EM64T). (*2) Only for disk arrays conted via FC
Memory	OS required memory + 5 MB or more (IA32 server and EM64T server)
Disk capacity	12 MB or more

* Above are the supported environments for this version at the point of the initial shipment of this product.

Installation

Install the SnapSAN Manager Agent Utility by following the procedure below:

1. Log in as a root user.
2. Verify that none of the following software has been installed:

- iSMrpl (ReplicationControl)
- iSMrcd (ReplicationControl/DisasterRecovery)

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- iSMsc (SnapControl)
- iSMvol (iSM volume list command)
- iSMagent (SnapSAN Manager Agent Utility)

The commands listed verifies is the applications have been installed.

3. Run the following commands in order to verify if they are already installed and check the results:

```
rpm -q iSMrpl
rpm -q iSMrcd
rpm -q iSMsc
rpm -q iSMvol
rpm -q iSMagent
```

4. Use the `rpm` command to start installation.

```
rpm -ivh /cdrom/VOLLIST/LINUX/iSMVOL/iSMvol.rpm
```

When the installation is complete, the ***Installation completed*** message appears.

Collecting/Registering Host Information on Application Server - Linux

Collecting Host Information by Using File Output

To collect host information by using file output see "Collecting Host Information by Using File Output - Windows"

Registering Host Information by Using File Output

To register host information files transferred to clients, see *"Registering Host Information by Using File Output"*

Report a host information file.

See *"Registering Host Information by Using File Output"* to report a host information file.

Transfer the host information file.

Use file transfer, USB memory or other methods to transfer the host information file to a client.

Checking Connection from Application Server - Linux

This section describes how to check connection in Linux environment and check the Path Manager settings and status.

Confirmation Steps in Linux environment

1. After checking the FC cable connection between the application server and disk array controller, restart the application server

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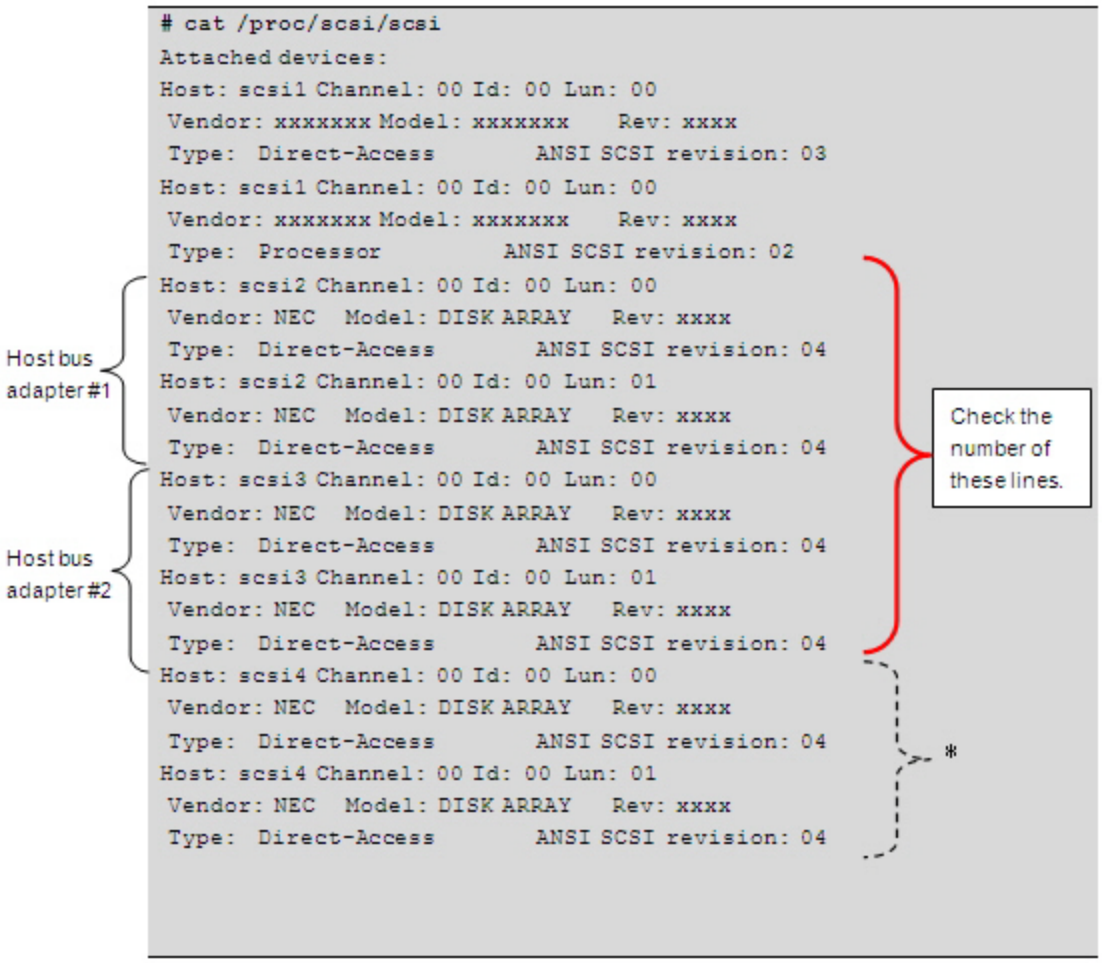
2. Run the following command: cat/proc/scsi/scsi to check the number of logical disks ("No. of logical disks assigned to application server" × "No. of access paths from application server to individual logical disks") and the respective vendor and model names (, DISK ARRAY).

NOTE: If nothing is shown, the OS was unable to recognize logical disks in the disk array assigned to an application server. Check the connection between the server and disk array controller, access control host bus adapter driver settings, etc.

Display example: When two logical disks are assigned to a server, with two access paths per logical disk.




```
# cat /proc/scsi/scsi
Attached devices:
Host: scsi1 Channel: 00 Id: 00 Lun: 00
 Vendor: xxxxxxx Model: xxxxxxx    Rev: xxxx
 Type:  Direct-Access        ANSI SCSI revision: 03
Host: scsi1 Channel: 00 Id: 00 Lun: 00
 Vendor: xxxxxxx Model: xxxxxxx    Rev: xxxx
 Type:  Processor          ANSI SCSI revision: 02
Host: scsi2 Channel: 00 Id: 00 Lun: 00
 Vendor: NEC   Model: DISK ARRAY    Rev: xxxx
 Type:  Direct-Access        ANSI SCSI revision: 04
Host: scsi2 Channel: 00 Id: 00 Lun: 01
 Vendor: NEC   Model: DISK ARRAY    Rev: xxxx
 Type:  Direct-Access        ANSI SCSI revision: 04
Host: scsi3 Channel: 00 Id: 00 Lun: 00
 Vendor: NEC   Model: DISK ARRAY    Rev: xxxx
 Type:  Direct-Access        ANSI SCSI revision: 04
Host: scsi3 Channel: 00 Id: 00 Lun: 01
 Vendor: NEC   Model: DISK ARRAY    Rev: xxxx
 Type:  Direct-Access        ANSI SCSI revision: 04
Host: scsi4 Channel: 00 Id: 00 Lun: 00
 Vendor: NEC   Model: DISK ARRAY    Rev: xxxx
 Type:  Direct-Access        ANSI SCSI revision: 04
Host: scsi4 Channel: 00 Id: 00 Lun: 01
 Vendor: NEC   Model: DISK ARRAY    Rev: xxxx
 Type:  Direct-Access        ANSI SCSI revision: 04
```

NOTE: In the environment where Path Manager is installed, in some cases, depending on the Linux kernel version, the logical disks that can be controlled by Path Manager are displayed after the logical disks recognized by the OS via the host bus adapter (comprised in the above example of host bus adapter #1 and host bus adapter #2).

Check the Path Manager Settings and Status

If Path Manager is not used and MPIO is used, the following step is not necessary:

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1. After checking the FC cable connection between the application server and disk array controller, restart the server.
2. Run the following commands: `uname -r` and `rpm -qi`. from the command prompt. For details, refer to the *Path Manager User's Guide (Linux version)*.
3. **Check the kernel version**
   a. Verify that the installed Path Manager supports the currently used kernel.
   b. Verify that kernel version (A) number shown under `uname -r` matches the value shown for kernel version (B) under `rpm -qi`.

```
# uname -r
2.6.X-XX
# rpm -qa | grep sps
sps-drivers-E-5.x.x
sps-utils-5.x.x-x.x
# rpm -qi sps-drivers-E-5.x.x
Name   : sps-driver-E            Relocations: (not relocatable)
Version : 5.x.x                    Vendor:  Corporation
Release : 2.6.x.x.x              Build Date: xxxx(year) xx (month) xx
(day) xx (hour) xx (min) xx (sec)
Install Date: xxxx(year)xx(month)xx(day) xx(hour)xx(min)xx(sec) Build
Host: .co.jp
Group     : System Environment/Kernel    Source RPM: sps-driver-E-5.x.x-
2.6.x.x.x.src.rpm
Size      : xxxx                     License: GPL
Signature   : (none)
Packager   :  Corporation
Summary    : Path Manager for Linux
Description :
---------------------------------------------------------------------
The driver (dd_mod,sps_mod,sps_mod2) provides the redundant SCSI-path
for
 iStorage Disk Array System.

This Driver works on Red Hat Enterprise Linux 5 (2.6.x-x.x)
```

NOTE: Display may vary slightly among different operating systems

Check the Path Manager status

4. Check `/proc/scsi/sps/ddX`, where X is a, b, c, ... (number of logical disks assigned to server).

The `path-info:` line exists only for multiplexed sections of each device, and if NML appears in all of the status columns of device-info:, paths are normally multiplexed.

NOTE: If nothing is shown, none of the access paths recognized the logical disks of the disk array controller assigned to the application server. Check the connection between the application server and the disk array controller, the Access Control settings, host bus adapter driver settings, etc.

Display example: When two logical disks are assigned to a server, with two access paths per logical disk.

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```
# cat /proc/scsi/sps/dda
device:/dev/dda
disk-info:,DISK ARRAY,xxxxxxxxxxxxxxx,xxxxx
device-info:Host:scsi:2 Channel:0 Id:0 Lun:0 Watch:Enable Status:NML
LoadBalance:D2
path-info:0 Host:scsi:0 Channel:0 Id:0 Lun:0 Priority:1 Status:ACT
path-info:1 Host:scsi:1 Channel:0 Id:0 Lun:0 Priority:2 Status:HOT
#
```

Check the path patrol daemon

5. Confirm that the path patrol daemon is running.
6. When the path patrol daemon is started, the following message is displayed.

```
# /etc/rc.d/init.d/dd_daemon status
dd_daemon (pid XXX) is running ...
#
```


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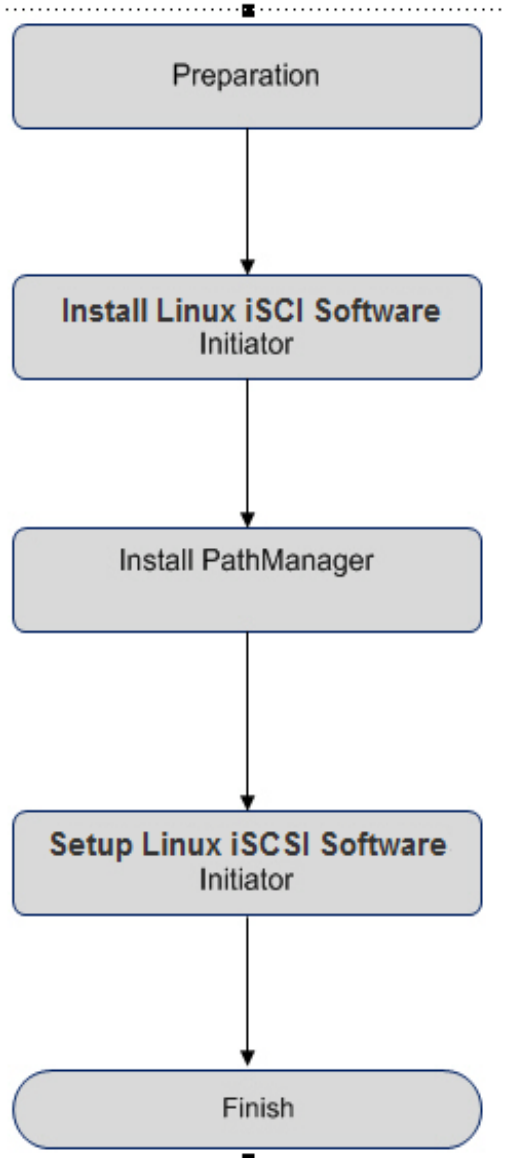
Appendix E

Linux iSCSI Application Server

Perform the following steps to initialize the application server in Linux environments.

Table E-1:

Process Flow	Description
	Prepare for installation. For details, refer to "Preparation." Install the iSCSI-initiator-utils package. For details, refer to Installing iSCSI Software Initiator. If the iSCSI-initiator-utils package has already been installed, this step is not necessary. Install Path Manager. For details, refer to Installing Path Manager. When Path Manager will not be used, this step is not necessary. This describes how to set up the Open-iSCSI driver and CHAP authentication. For details, refer to Setting up iSCSI Software Initiator

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Preparation

Perform the following steps to prepare for installation of application server in Linux environment:

1. Provide IP addresses for an application server

   Prepare IP addresses to be assigned to the application server as many as the NIC (1000BASE-T or 10GBASE-SR) ports. In addition, prepare the subnet mask and gateway addresses by asking the network administrator.

⚠ CAUTION: If two or more IP addresses are used by Path Manager, the same network segment cannot be specified. Prepare IP addresses of other segments.

Example 1: Connectable configuration
HP0:192.168.0.10
HP1:192.168.1.10
Example 2: Unconnectable configuration
HP0:192.168.0.10
HP1:192.168.0.11

---

2. Install the NIC (1000BASE-T or 10GBASE-SR) driver

   Install and set up the driver according to the setup procedure in the manual provided with the NIC installed in the server, or by referencing information provided on the Web, etc.

   NOTE: If the NIC has already been attached to the application server, this step is not necessary.

3. Install NIC (1000BASE-T or 10GBASE-SR)

   Install the NIC to the application server as described in the manuals provided with the NIC and application server

   NOTE: If NIC has already been installed to the application server, this step is not necessary.

4. Install the NIC (1000BASE-T or 10GBASE-SR) driver
5. Install and set up the driver according to the setup procedure in the manual provided with the NIC installed in the server, or by referencing information provided on the Web, etc.

   NOTE: If the driver has already been installed and set up for the NIC installed in the application server, this step is not necessary.

6. Specify the network settings

   Select **Start > Control Panel > Network Connection**, and then open **Local Area Connection Properties** to specify the IP address, subnet mask, and default gateway.

7. Connect to the disk array controller

   Use a 10-Gbps or 1-Gbps cable to connect the application server to the host port (HP connector) of the disk array controller.

- Unit equipped with 10Gbps iSCSI 2port controllers

  10-Gbps cable

  Connector shape: LC connector

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NOTE: FC cable can be used.

- Unit equipped with 1Gbps iSCSI 2port controllers

  1-Gbps cable

  Connector shape: RJ-45 connector

NOTE: CAT6 LAN cable is recommended.

Either straight cable or crossover cable can be used.

The following shows the positions of the host ports.

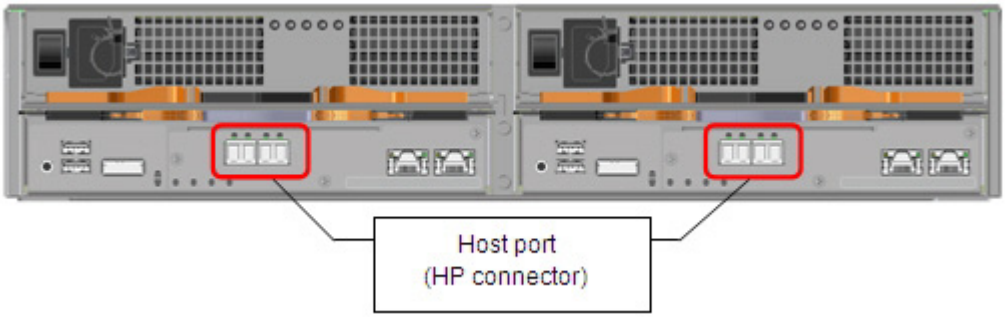

Figure E-1: Unit 10Gbps iSCSI 2port Controllers

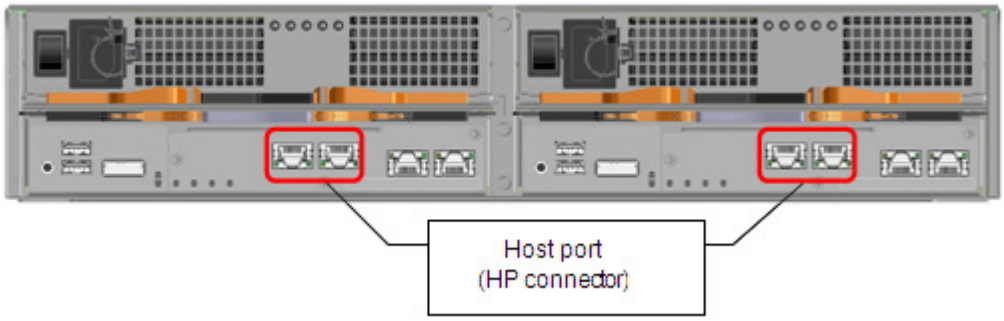

Figure E-2: Unit with1Gbps iSCSI 2port Controllers

The following shows an example of a 10-Gbps iSCSI connection (redundant path configuration in combination with Path Manager).

To implement the following recommended example, two NICs must be installed in the application server and two 10-Gbps cables are needed to connect the disk array controller and NICs.

Use a 10-Gbps cable to connect the NIC to the host port (HP connector) of the disk array controller. (The 10-Gbps cable has the same connector shape on both ends.)

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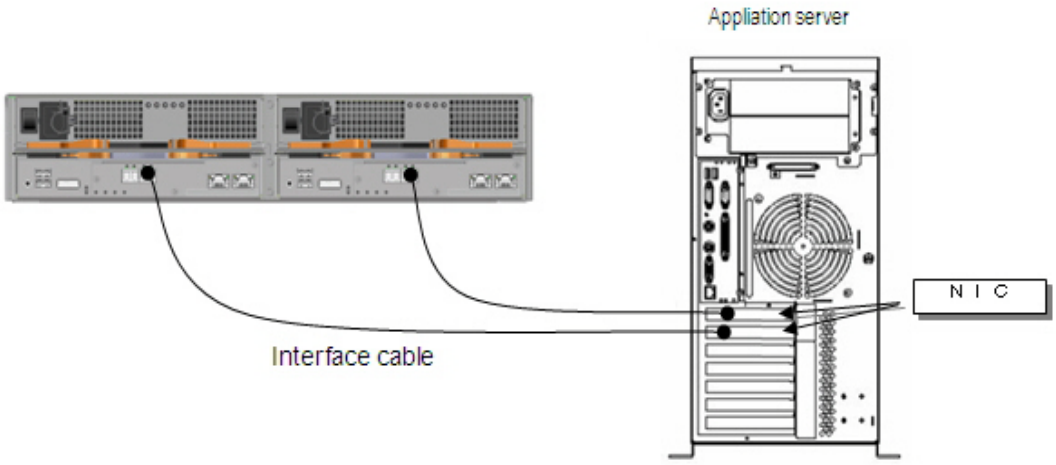

Figure E-3: Configuration Example

Installing iSCSI Software Initiator

Installation of iscsi-initiator-utils package is necessary.

Install the package by following the procedures on the manual of the operating system or the information provided on the website.

NOTE: This procedure is unnecessary if the installation of iscsi-initiator-utils package is already finished.Open-iscsi is installed as standard DBM database. Discovery (discovery.db) and Node (node.d) tables are included. The iSCSI database files are stored in /etc/iscsi/.

Install iscsi-initiator-utils package.

```
# yum install iscsi-initiator-utils
```

Installing Path Manager

See "Linux Application Server" for installation procedure.

This operation is not necessary if you do not install Path Manager.

Setting up iSCSI Software Initiator

Perform the following steps to install iSCSI Software Initiator in the Linux environment:

Set up Open-iSCSI Driver

1. Run the following command from the console to stop the iSCSI service.

```
# service iscsid stop
```

NOTE: If the iSCSI service has already been stopped, this step is not necessary.

2. Use `vi` or another editor to open the `/etc/iscsi/iscsid.conf` file on the server.
3. After changing the settings in the variables shown in *Table E-2: Open-iSCSI Driver Settings* to the following values, save and close the file.

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Table E-2: Driver Settings

Variable Name	Default value	Set value	Remarks
node.startup	No	Automatic	Automatically log on after the server reboots
node.session.timeo.replacement_ timeout	120	30	Shorten the failover time when using Path Manager

```
node.startup = Automatic
node.session.timeo.replacement_timeout = 30
```

4. Run the following command from the console to start the iSCSI service.

```
# service iscsi start
```

5. Run the following command from the console to confirm that the iSCSI service is operating.

```
# /etc/init.d/iscsi status
```

Set up CHAP Authentication

If CHAP authentication will not be used, this step is not necessary. For description of CHAP authentication, refer to *Appendix J, "CHAP"*

- Setup method when using **CHAP authentication of Initiator**.

1. Use `vi` or another editor to open the `/etc/iscsi/iscsid.conf` file on the server.
2. After editing the file as shown below, save and close the file.

```
node.session.auth.authmethod = CHAP
node.session.auth.username = <iqn (username) of
server>
node.session.auth.password = <password of CHAP
Initiator>

(Example)
node.session.auth.authmethod = CHAP
node.session.auth.username = iqn.1991-
05.com.microsoft.exp120rj
node.session.auth.password = jR021_0085sserpxE
```

3. Restart the iSCSI service

```
# /etc/init.d/iscsi stop
# /etc/init.d/iscsi start
```

CAUTION: The CHAP Initiator password that is set here is a password that a target uses to authenticate the Initiator. This password is also required for settings on the disk array side (see *iSMcfg setIdsetchap in the SnapSAN Manager Command Reference*), so be sure to write it down so it is not forgotten.

- Setup method when using **bidirectional CHAP authentication**.

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1. Use `vi` or another editor to open the `/etc/iscsi/iscsid.conf` file on the server.
2. Edit the file as shown below, then save and close the file.

```
node.session.auth.authmethod = CHAP
node.session.auth.username = <iqn (username) of
server>
node.session.auth.password = <password of CHAP
Initiator>
node.session.auth.username_in= <iqn (username) of
disk array>
node.session.auth.password_in = < password of CHAP
target>

(Example)
node.session.auth.authmethod = CHAP
node.session.auth.username = iqn.1991-
05.com.microsoft.exp120rj
node.session.auth.password = jR021_0085sserpxE
node.session.auth.username_in = iqn.2001-
03.jp.nec:storage01:ist-m000-sn-
0000000938209213.wn-0.target0000 -p
192.168.10.64:3260
node.session.auth.password_in = i3DegarotsiCEN
```

3. Restart the iSCSI service.

```
# /etc/init.d/iscsi stop
# /etc/init.d/iscsi start
```

CAUTION: The CHAP Initiator password that is set here is a password that a target uses to authenticate the Initiator. This password is also required for settings on the disk array side (see *iSMcfg setIdsetchap in the SnapSAN Manager Command Reference*), so be sure to write it down so it is not forgotten.

Execute Discovery

- Method when not using iSNS (Internet Storage Name Service) server

4. Use the `iscsiadm` command to search for the target.

```
# iscsiadm -m discovery -t sendtargets -p <IP
address of disk array>
(Example)# iscsiadm -m discovery -t sendtargets -
p 192.168.1.1:3260
```

- Method when using iSNS server

5. Use `vi` or another editor to open the `/etc/iscsi/iscsid.conf` file on the server.

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6. Set the IP address and port number of the corresponding iSNS server.
7. Restart iSCSI service.

```
# /etc/init.d/iscsi stop
# /etc/init.d/iscsi start
```

8. Get Initiator information from an application server registered to iSNS server.

NOTE: When using iSNS server, the Initiator name of the application server must be directly entered under the Initiator settings in the iSCSI Setup Tool.

iSCSI Setup Tool

Run the iSCSI Setup Tool on an application server to configure the iSCSI settings required for the application server. Before starting the following section, you need to install the SnapSAN Manager Agent Utility. See SnapSAN Manager Agent Utility Section for details on how to install the SnapSAN Manager Agent Utility.

1. Run the following script on the application server.

```
# iSMiSCSISetup.sh
```

2. When a list of serial numbers is shown as follows, enter a list number corresponding to the serial number of the disk array controller you want to configure.

```
1) 0000000991000001
2) 0000000991000002
3) 0000000991000003
4) 0000000991000004
Please select serial number.
```

3. The following message appears to confirm whether to use CHAP authentication. Enter y to use the CHAP authentication. Enter n to skip the CHAP authentication.

```
To use CHAP authentication, please enter 'y'. [y/n]
```

4. When n is entered to skip the CHAP authentication, proceed to step (9). When y is entered to use the CHAP authentication, the following message appears. Enter the password of the CHAP initiator.

```
Please enter the target CHAP secret.
```

5. To confirm, enter the password of the CHAP initiator again.

```
Please enter password again.
```


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6. This is to confirm whether to use mutual CHAP authentication. Enter y to use the mutual CHAP authentication. Enter n to skip the mutual CHAP authentication.

```
To use mutual CHAP authentication, please enter 'y'. [y/n]
```

7. Proceed to step (9) when n is entered to skip the CHAP authentication. If y is entered to use the mutual CHAP authentication, the following message appears. Enter the password of the CHAP target.

```
Please enter the initiator secret.
```

8. To confirm, enter the password of the CHAP target again.

```
Please enter password again.
```

9. The IP addresses of the disk array are listed as follows. Enter a list number corresponding to the IP addresses of the disk array. iSCSI Setup Tool runs a ping command using the IP addresses that are set in the host connection port parameters. It does not show failed results and delete the failed ones from the search result of the target.

```
1) Serial number=0000000991000004, Controller=0, IP
address=172.168.1.101
2) Serial number=0000000991000004, Controller=0, IP
address=172.168.1.102
3) Serial number=0000000991000004, Controller=1, IP
address=172.168.2.101
4) Serial number=0000000991000004, Controller=1, IP
address=172.168.2.102
Please select target IP address.
```

10. After the following message appears to confirm whether to create an LD set, enter y to proceed.

```
To create LD set, please enter 'y'. [y/n]
```

11. When the process is successfully complete, a list of the IP addresses appears as follows:

```
Succeed to log on to the target.
Serial number=XXXXXXXXXXXXXXXX, Controller=X, IP
address=XXX.XXX.X.XXX
```

The above is an example. You will actually see the serial number, controller number and IP address of the target. You can specify a parameter file as shown below.

```
# iSMiSCSISetup.sh [-f <parameter name> [-n]]
```


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- When you specify `-f <parameter name>`, a parameter is loaded from the file specified.
- When you specify `-n`, a dry run is performed to check for any parameter error, and does not process

The details of the parameter file are described as follows.

Details

```
-m <Serial number>
-I <Password of CHAP initiator>
-t <Password of CHAP target>
-p <IP address of host connection port>
```

Descriptions

- In case CHAP authentication is not used, you do not need to supply a password of the CHAP initiator and a password of the CHAP target. When you use CHAP authentication, use the initiator name for the user name of CHAP initiator.
- In case mutual CHAP authentication is not used, you do not need to supply a password of CHAP target. When you use mutual CHAP authentication, use the target name for the user name of CHAP target.
- Lines, where any other letters than ones mentioned above is specified followed by a hyphen (-), are ignored and the operation continues.

For example: When CHAP authentication is not used.

```
-m 0000000991000004
-p 172.168.1.101
```

For example: When Mutual CHAP authentication is used.

```
-m 0000000991000004
-i jR0210085sserpxE
-t i3DegrarotsiCEN
-p 172.168.1.101
```

CAUTION: See below

It is necessary to configure a public key with SnapSAN Manager for SSH connection.

How to register:

1. When you run the following command, it prompts for your parameter entry Do not enter anything but press the Enter key

```
ssh-keygen -t rsa
```

2. After you run the following command, it prompts for a user name and password entries. Enter sysadmin for the user name and the password of the sysadmin user.

```
ftp <IP addresses of management ports for SnapSAN Manager>
After you subsequently run the following commands, run the quit
command to end the FTP.
cd .ssh
get authorized_keys
```


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3. Run the following command.

```
cat ./.ssh/id_rsa.pub >> authorized_keys
```

4. When you run the following command, it prompts for a user name and password entries. Enter sysadminj for the user name and the password of the sysadmin user.

```
ftp < IP addresses of management ports for SnapSAN Manager>>
```

5. After you subsequently run the following commands, run the quit command to end the FTP.

```
cd .sshput authorized_keys
```

6. Run the following command.

```
ssh sysadmin@< IP addresses of management ports for SnapSAN
Manager>>
```

7. When the following message appears, enter `yes`.

```
Are you sure you want to continue connecting (yes/no)?
```

8. Check it does not prompt for a password entry, and then run the exit command to end SSH.

- Because the port number 2730 is used, you need to set the exception for the firewall.
- iSCSI Initiator needs to be installed and the service must be started in advance.

If you use the CHAP authentication with two or more disk arrays, please follow the procedures shown as below.

Procedures

1. Configure the iSCSI setting using iSCSI Setup Tool.
2. Execute the following command in the order as below. (If there are two or more IP addresses succeeded to log on, execute the iscsiadm command repeatedly to each IP address.)

```
service iscsi stop
iscsiadm -m node -o delete -p <target IP addresss succeeded to log
on in step 1.>
service iscsi start
```

3. Select the IP address of another disk array by iSCSI Setup Tool, and configure the iSCSI setting.
4. Execute the following command. (If there are two ore more IP addresses succeeded to log on, use the first IP address specified in step 2.)

```
iscsiadm -m discovery -t sendtargets -p <target IP addresss
succeeded to log on in step 1.>
```


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5. Execute the following commands.

```
iscsiadm -m node --targetname <target name specified in step /1/> -
p <target IP addresss succeeded to log on in step /1/> --op update
-n node.session.auth.authmethod -v CHAP
iscsiadm -m node --targetname <target name specified in step /1/> -
p <target IP addresss succeeded to log on in step /1/> --op update
-n node.session.auth.username -v <initiator name>
iscsiadm -m node --targetname <target name specified in step /1/> -
p <target IP addresss succeeded to log on in step /1/> --op update
-n node.session.auth.password -v <CHAP password for the initiator>
```

6. f you use mutual CHAP authentication, execute the following commands.

```
iscsiadm -m node --targetname <target name specified in step 1.> -p
<target IP address succeeded to log on in step 1.> --op update -n
node.session.auth.username_in -v <target name specified in step 1.>
iscsiadm -m node --targetname <target name specified in step 1.> -p
<target IP address succeeded to log on in step 1.> --op update -n
node.session.auth.password_in -v <CHAP password for the target>
```

7. Execute the following command.

(If there are two or more IP addresses succeeded to log on, repeat the steps 5-7)

```
iscsiadm -m node --targetname <target name specified in step 1.> -p
<target IP address succeeded to log on in the step 1.> -l
```

* If you use three or more disk arrays, repeat the procedures in steps 1-2 repeatedly, and then perform the procedure in step 3 for the last disk array controller. And then perform the procedure the steps 4–7 repeatedly for each disk arrays you have done the procedures in step 1-2.)

Checking Connection from Application Server

Perform the following steps to connect the application server and disk array in Linux environments.

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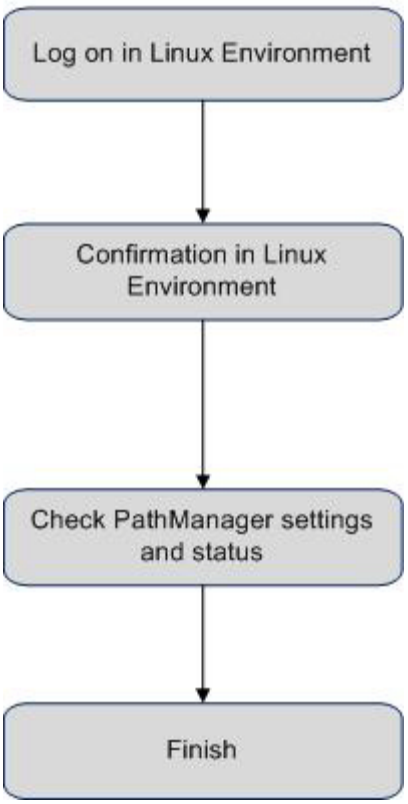
Table E-3: Process Flow

Process Flow	Description
	Log on to the target. Confirm the that OS recognizes the logical disk. Check Path Manager settings and status. If Path Manager will not be used, this step is not necessary.

Logon Steps in Linux Environments

1. Search for target.

```
# iscsiadm –m discovery –t sendtargets –p <IP
address of disk array>
(Example)# iscsiadm –m discovery –t sendtargets –p
192.168.10.64:3260
```

2. Log on to target.

```
# iscsiadm –m node –T <iqn of disk array> –p <IP
address of disk array> –l
(Example)# iscsiadm –m node –T
iqn.2001-03.jp.nec:storage01:ist-m000-
sn0000000938209213.
wn-0.target0000 –p 192.168.10.64:3260 –l
```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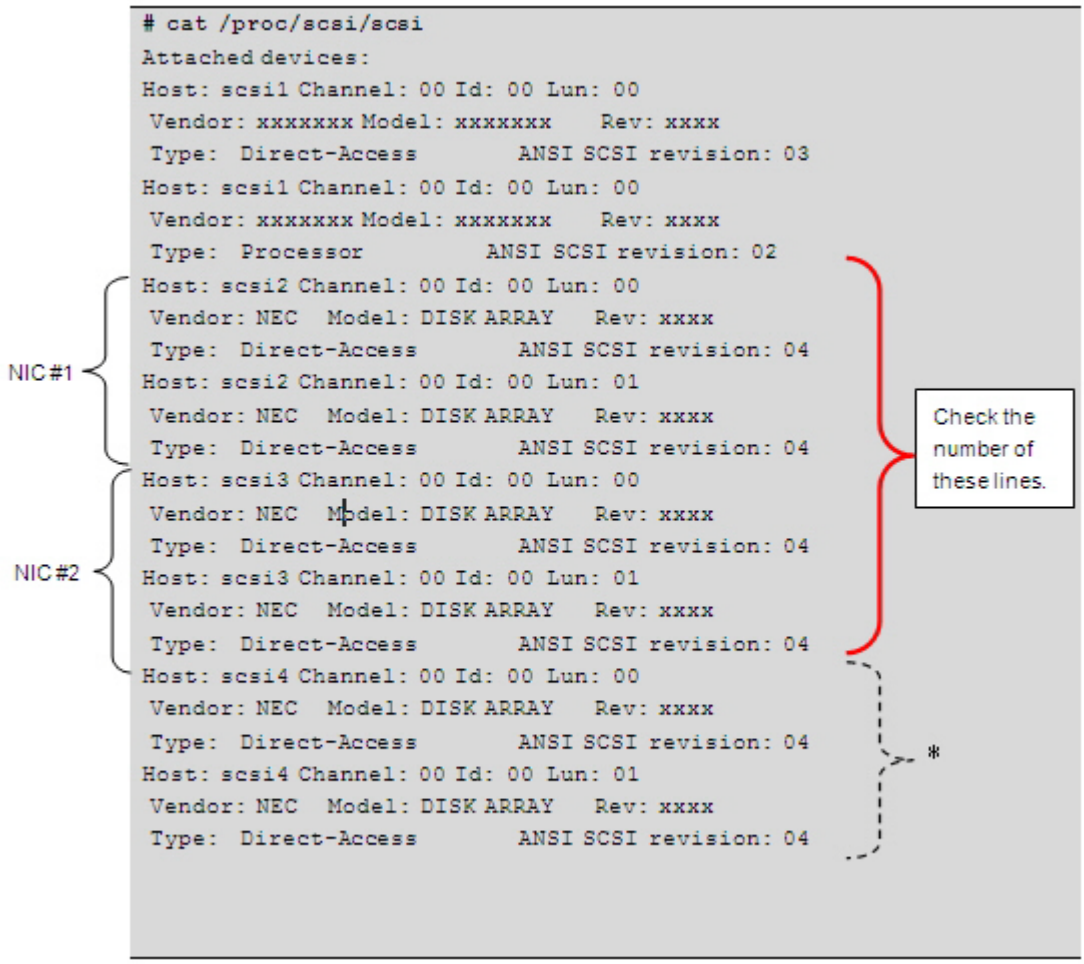
Confirmation steps in Linux Environment

Run the following command to check the number of logical disks (No. of logical disks assigned to application server × No. of access paths from application server to individual logical disks) and the respective vendor and model names (DISK ARRAY).

```
# cat /proc/scsi/scsi
```

CAUTION: If nothing is shown, none of the access paths recognized the logical disks of the disk array controller assigned to the application server. Check the connection between the application server and the disk array controller, the Access Control settings, NIC driver settings and so on.

Display example: When two logical disks are assigned to a server, with two access paths per logical disk.




```
# cat /proc/scsi/scsi
Attached devices:
Host: scsi1 Channel: 00 Id: 00 Lun: 00
 Vendor: xxxxxxx Model: xxxxxxx    Rev: xxxx
 Type:  Direct-Access        ANSI SCSI revision: 03
Host: scsi1 Channel: 00 Id: 00 Lun: 00
 Vendor: xxxxxxx Model: xxxxxxx    Rev: xxxx
 Type:  Processor          ANSI SCSI revision: 02
Host: scsi2 Channel: 00 Id: 00 Lun: 00
 Vendor: NEC   Model: DISK ARRAY   Rev: xxxx
 Type:  Direct-Access        ANSI SCSI revision: 04
Host: scsi2 Channel: 00 Id: 00 Lun: 01
 Vendor: NEC   Model: DISK ARRAY   Rev: xxxx
 Type:  Direct-Access        ANSI SCSI revision: 04
Host: scsi3 Channel: 00 Id: 00 Lun: 00
 Vendor: NEC   Model: DISK ARRAY   Rev: xxxx
 Type:  Direct-Access        ANSI SCSI revision: 04
Host: scsi3 Channel: 00 Id: 00 Lun: 01
 Vendor: NEC   Model: DISK ARRAY   Rev: xxxx
 Type:  Direct-Access        ANSI SCSI revision: 04
Host: scsi4 Channel: 00 Id: 00 Lun: 00
 Vendor: NEC   Model: DISK ARRAY   Rev: xxxx
 Type:  Direct-Access        ANSI SCSI revision: 04
Host: scsi4 Channel: 00 Id: 00 Lun: 01
 Vendor: NEC   Model: DISK ARRAY   Rev: xxxx
 Type:  Direct-Access        ANSI SCSI revision: 04
```

***** In the environment where Path Manager is installed, in some cases, depending on the Linux kernel version, the logical disks that can be controlled by Path Manager are displayed after the logical disks recognized by the OS via the NIC (comprised in the above example of NIC#1 and NIC#2).

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Check the Path Manager Settings and Status

NOTE: When Path Manager will not be used, this step is not necessary.

1. Check the kernel version

Check that the installed Path Manager supports the currently used kernel. Check that kernel version (A) number shown under uname -r matches the value shown for kernel version (B) under rpm -qi.

```
# uname -r
2.6.X-XX
# rpm -qa | grep sps
sps-drivers-E-5.x.x
sps-utils-5.x.x-x.x
# rpm -qi sps-drivers-E-5.x.x
Name    : sps-driver-E          Relocations: (not
relocatable)
Version  : 5.x.x             Vendor: Overland Storage
Release : 2.6.x.x.x           Build Date: xxxx(year)
xx (month) xx (day) xx (hour) xx (min) xx (sec)
Install Date: xxxx(year) xx (month) xx (day) xx
(hour) xx (min) xx (sec) Build Host: nec.co.jp
Group    : System Environment/Kernel   Source RPM:
sps-driver-E-5.x.x-2.6.x.x.x.src.rpm
Size    : xxxx               License: GPL
Signature  : (none)
Packager  : Overland Storage
Summary   : Path Manager for Linux
Description :
-----------------------------------------------------
----------------The driver (dd_mod,sps_mod,sps_mod2)
provides the redundant SCSI-path for
iStorage Disk Array System.

This Driver works on Red Hat Enterprise Linux 5
(2.6.x-x.x)
```

2. Check the Path Manager status

Check /proc/scsi/sps/ddX, where X is a, b, c, ... (number of logical disks assigned to server).

The path-info: line exists only for multiplexed sections of each device, and if NML appears in all of the status columns of device-info:, paths are normally multiplexed.

CAUTION: If nothing is shown, none of the access paths recognized the logical disks of the disk array controller assigned to the application server. Check the connection between the application server and the disk array controller, the Access Control settings, NIC driver settings and so on.

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Display example: When two logical disks are assigned to a server, with two access paths per logical disk.

```
# cat /proc/scsi/sps/dda
device:/dev/dda
disk-info: DISK ARRAY,xxxxxxxxxxxxxxx,xxxxx
device-info:Host:scsi:2 Channel:0 Id:0 Lun:0
Watch:Enable Status:NML
LoadBalance:D2
path-info:0 Host:scsi:0 Channel:0 Id:0 Lun:0
Priority:1 Status:ACT
path-info:1 Host:scsi:1 Channel:0 Id:0 Lun:0
Priority:2 Status:HOT
#
```

3. Check the path patrol daemon

Confirm that the path patrol daemon is operating. When the path patrol daemon is started, the following message is displayed.

```
# /etc/rc.d/init.d/dd_daemon status
dd_daemon (pid XXX) is running ...
#
```


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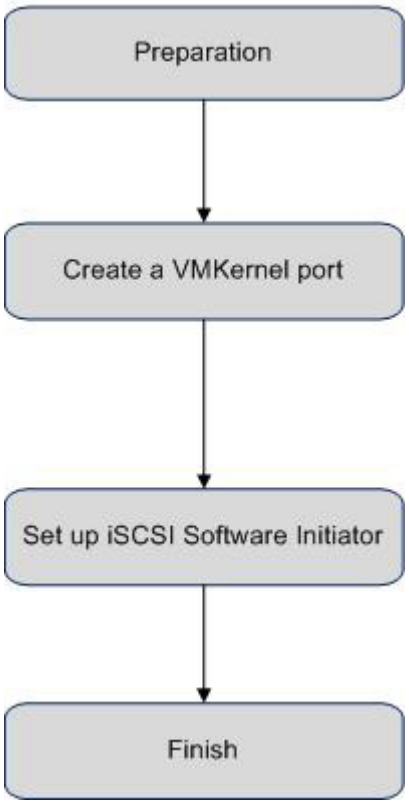
Appendix F

VMware iSCSI Application Server

This appendix provides the steps you should follow while setting or checking an application server in the VMware environment, when the disk array is configured for the iSCSI connection.

Initializing Application Server

Perform the following steps to initialize the application server in the VMware environment.



Prepare for installation.
For details, refer to "Preparation"

Create a VMKernel port and connect iSCSI to the network.
For ESX Server 3, connect the service console to the iSCSI network.
For details, refer to "Creating VMKernel Port"

Set the iSCSI Software Initiator as active, and then set the target address of the Initiator. If necessary, enter settings for CHAP authentication.
For details, refer to "Setting up Software iSCSI Initiator"

Preparation

Perform the following steps to prepare for installation of application server in VM environment:

1. Provide IP addresses for an application server

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Prepare IP addresses to be assigned to the application server as many as the NIC (1000BASE-T or 10GBASE-SR) ports. In addition, prepare the subnet mask and gateway addresses by asking the network administrator.

CAUTION: If two or more IP addresses are used by Path Manager, the same network segment cannot be specified. Prepare IP addresses of other segments.

Example 1: Connectable configuration
HP0:192.168.0.10
HP1:192.168.1.10
Example 2: Unconnectable configuration
HP0:192.168.0.10
HP1:192.168.0.11

2. Install the NIC (1000BASE-T or 10GBASE-SR) driver

Install and set up the driver according to the setup procedure in the manual provided with the NIC installed in the server, or by referencing information provided on the Web, etc.

NOTE: If the NIC has already been attached to the application server, this step is not necessary.

3. Install NIC (1000BASE-T or 10GBASE-SR)

Install the NIC to the application server as described in the manuals provided with the NIC and application server

NOTE: If NIC has already been installed to the application server, this step is not necessary.

4. Install the NIC (1000BASE-T or 10GBASE-SR) driver
5. Install and set up the driver according to the setup procedure in the manual provided with the NIC installed in the server, or by referencing information provided on the Web, etc.

NOTE: If the driver has already been installed and set up for the NIC installed in the application server, this step is not necessary.

6. Specify the network settings

Select **Start > Control Panel > Network Connection**, and then open **Local Area Connection Properties** to specify the IP address, subnet mask, and default gateway.

7. Connect to the disk array controller

Use a 10-Gbps or 1-Gbps cable to connect the application server to the host port (HP connector) of the disk array controller.

- Unit equipped with 10Gbps iSCSI 2port controllers

  10-Gbps cable

  Connector shape: LC connector

NOTE: FC cable can be used.

- Unit equipped with 1Gbps iSCSI 2port controllers

  1-Gbps cable

  Connector shape: RJ-45 connector

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NOTE: CAT6 LAN cable is recommended.

Either straight cable or crossover cable can be used.

The following shows the positions of the host ports.

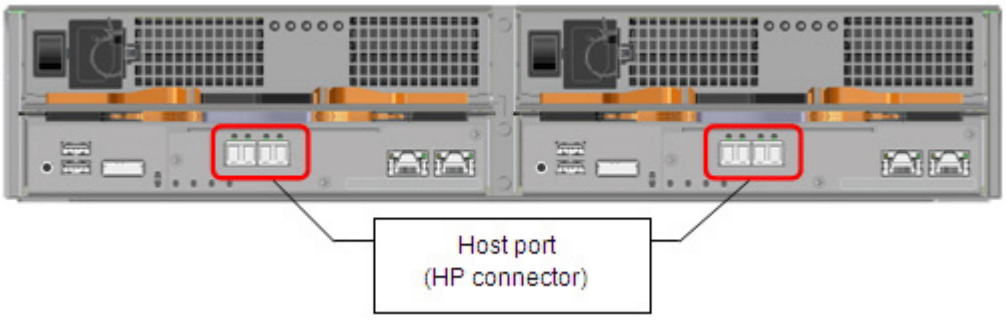

Figure F-1: Unit with 10Gbps iSCSI 2port Controllers

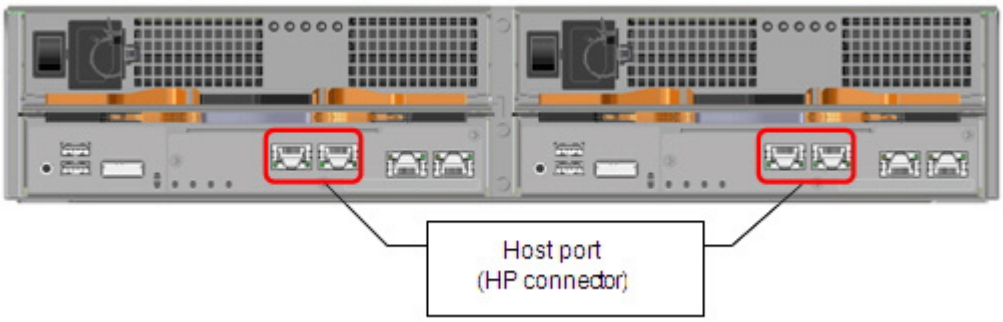

Figure F-2: Unit with 1Gbps iSCSI 2port Controllers

The following shows an example of a 10-Gbps iSCSI connection (redundant path configuration in combination with Path Manager).

To implement the following recommended example, two NICs must be installed in the application server and two 10-Gbps cables are needed to connect the disk array controller and NICs.

Use a 10-Gbps cable to connect the NIC to the host port (HP connector) of the disk array controller. (The 10-Gbps cable has the same connector shape on both ends.)

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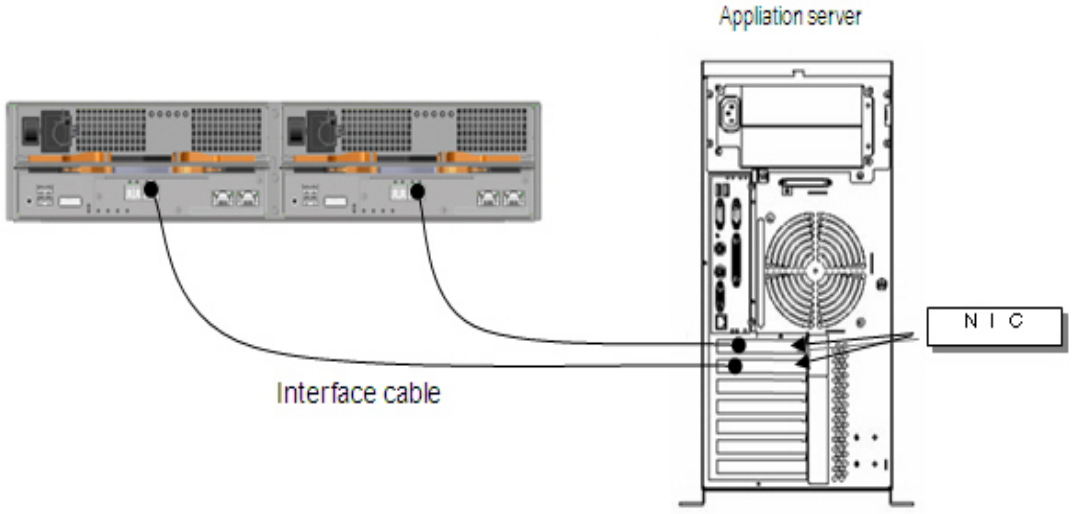

Figure F-3: Configuration Example

The following shows an example of a 10-Gbps iSCSI connection (redundant path configuration in combination with Path Manager).

To implement the following recommended example, two NICs must be installed in the application server and two 10-Gbps cables are needed to connect the disk array controller and NICs.

Use a 10-Gbps cable to connect the NIC to the host port (HP connector) of the disk array controller. (The 10-Gbps cable has the same connector shape on both ends.)

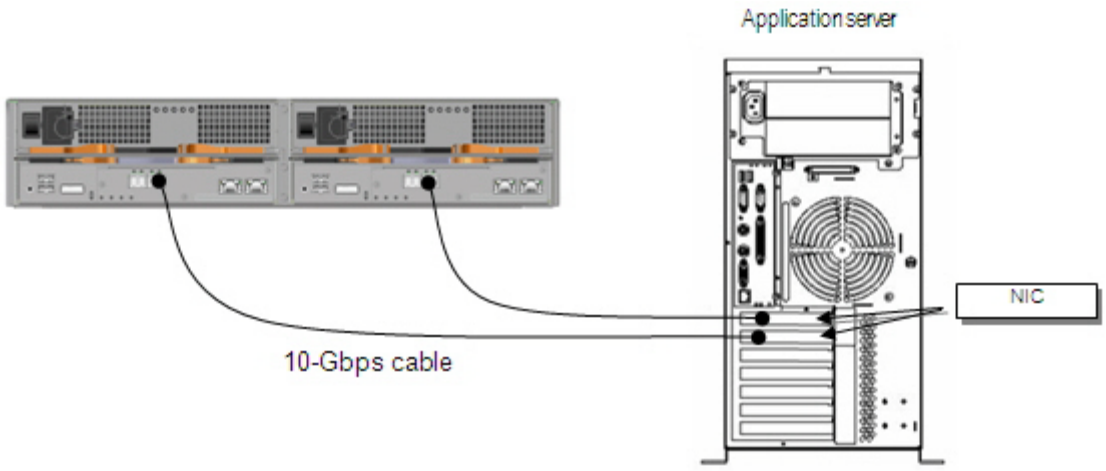

Figure F-4: Configuration Example

1. For the basic requirements when using iSCSI storage for ESX Server systems other than the above, refer to the OS Manual or to information provided on the Web and so on.
2. Prepare VMware Infrastructure Client (VI Client) operating environment

VI Client is a key component that generates, manages, and supervises virtual machines, virtual machine resources, and virtual machine hosts. VI Client must be installed on a Windows machine that supports network connection of ESX Server or VirtualCenter server environment.

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Creating VMKernel Port

The following operations must be performed before configuring iSCSI storage.

- Create a VMKernel port for iSCSI Software Initiator.
- Connect the service console to an iSCSI network (only when with ESX Server 3).

Create a VMKernel port for iSCSI Software Initiator

1. Log in to VI Client.
2. After selecting a server from the Inventory panel, click the **Network** button for the configuration. This opens the Hardware Configuration page.
3. Click **Add network**.
4. Select **VMKernel** in the **Connection Type** screen of the Add Network Wizard, and then click the **Next** button.

NOTE: With ESX Server 3i, the Service Console option is not shown in the wizard screen.

5. In the **VMKernel – Network Access** screen of the Add Network Wizard, select the vSwitch to be used or select **Create Virtual Switch**.
6. Select the check box for the network type used by vSwitch.
7. Click the **Next**.
8. Under Port Group Properties in the **VMKernel: connection setup** screen of the Add Network Wizard, select or type a network label and VLAN ID.

   a. For the IP setting, enter the IP address and subnet mask.

   b. Click the **Next**.

- **Network Label:** This name identifies the port group being created. When using this name to configure a VMKernel service such as Vmotion or IP storage, this label specifies the virtual adapter to connect to the port group.
- **VLAN ID:** This identifies the VLAN used for the port group's network traffic. A VLAN ID is not required. Check with the network administrator to determine whether or not this must be set.

1. A warning alarm is output if a default gateway has not been set. Click the **Yes** button.

CAUTION: A gateway setting is required when connecting to a machine that is not set for the same IP subnet as the service console (ESX Server 3 only) or VMKernel.

2. Set the IP address of each gateway corresponding to the "routing" service consoles and VMkernel in the **DNS and Routing Configuration** screen.
3. Click the **OK**.
4. Click **OK**.

   a. Verify the content of the **Settings Completed** screen. If there are no problems, click **Finish**.

5. Connect the service console to an iSCSI network (only when with ESX Server 3).
6. After creating a VMKernel port for iSCSI Software Initiator, connect a service console with the same vSwitch as for the target VMKernel port.

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IMPORTANT: This operation is not required when using ESX Server 3i.

1. After logging in to the VI Client, select a server from the Inventory panel. This opens the Hardware Configuration Page for this server.
2. Click the **Network** button for the configuration.
3. On the right side of the screen, click the **Properties** button for the vSwitch associated with the created VMKernel port.
4. Click the **Add** button for the port.
5. After selecting **Service console** in the **Connection Type** screen of the Add Network Wizard, click **Next**.
6. On the **Service Console: Connection Settings** screen of the Add Network Wizard, enter a Network label to identify the port group that was created under **Port Group Properties**.
7. Select either **Automatically retrieve IP settings** or **Use the following IP setting**.
   a. If you selected **Automatically retrieve IP settings.**
   a. If you selected **Use the following IP setting**, enter the IP address and subnet mask, then click the **Edit** button.
   b. Enter the IP address of the default gateway for service control. When settings are completed, click the **Next** button.
   c. In the **Settings Completed** screen of the Add Network Wizard, use the Preview function to check that vSwitch has been correctly configured, and then click the **Finish** button.

Setting up Software iSCSI Initiator

To configure Software iSCSI Initiator, activate Initiator and then set the target address for Initiator. This section describes the parameter settings related to CHAP authentication.

Activate software iSCSI Initiator, so that ESX Server can be used.

1. After logging in to VI Client, select a server from the Inventory panel.
2. Click the Storage Adapter button under the hardware to be configured. (A list of available storage adapters is displayed.)
3. After selecting an available software Initiator from the iSCSI software adapter, click Properties.
1. Click the Configure button under the General tab in the iSCSI Initiator Properties screen.
2. Select the **Enabled** check box under **Status** in the General Properties screen. After completing the settings, click **OK**.
3. Set the target detection address so that the software Initiator is able to designate access-enabled storage resources on the network.
4. Click the **Add** button under the **Dynamic Discovery** tab in the **iSCSI Initiator Properties** screen.
5. Enter the IP address of the server to be used as the target sending **iSCSI server**. After completing the settings, click the **OK** button.

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CHAP Parameter Settings

To change these CHAP parameters:

1. Click the CHAP Authentication tab in the iSCSI Initiator Properties screen.

- The default CHAP parameters are shown under the **CHAP Authentication** tab.
- To change these CHAP parameters, click the **Configure** button.

1. Click the **CHAP Authentication** tab in the **iSCSI Initiator Properties** screen and change the following settings the settings listed below. After completing the settings, click **OK**.

Certificate

1. Select the **Use the following CHAP credentials** option to activate CHAP authentication function.
2. Select the **Use Initiator Name** option to use the Initiator name as the CHAP name.
3. Enter any CHAP name to be used instead.
4. Enter the CHAP Secret in the **CHAP Secret** box.
5. Select **Disable CHAP authentication** to disable the CHAP authentication function.

IMPORTANT: For sessions after CHAP setup, the CHAP Secret is used to authenticate the Initiator. This has no effect on any session that has already been established. When CHAP has been disabled, the current session continues until a restart or a forced log-out of the disk array controller is executed. After a restart or a forced log-out of the disk array controller, it is no longer possible to connect to any disk array that requires CHAP authentication.

IMPORTANT: The CHAP Secret that is set here is a password that a target uses to authenticate the Initiator. This password is also required for settings on the disk array side (see *iSMcfg setIdsetchap in the SnapSAN Manager Command Line Interface Reference*). Record password and keep in a safe place.

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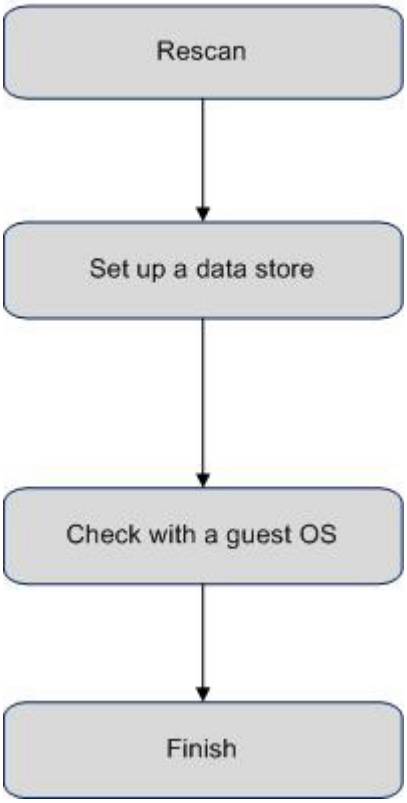
Checking Connection from Application Server

Perform the following steps to connect the application server and disk array controller in a VMware environment.



After executing a rescan, make sure that a list of available adapters is shown by the software iSCSI Initiator used to access software- activated iSCSI storage disk array controllers.

For details, refer to "Executing Rescan"

Set up a data store for the software-activated iSCSI storage device.

For details, refer to "Setting up a Data Store"

Make sure that the logical disks are recognized by the Guest OS.

For details, refer to "Confirmation Using Guest OS"

Executing Rescan

Perform the following steps:

1. Use VI Client to select a server, then select **Storage Adapter** as the configuration hardware setting.
2. Click **Rescan** under **Storage Adapter**.

IMPORTANT: Select an available software Initiator from displayed list of available iSCSI software adapters. This brings up a display of Initiator details such as the model name, IP address, iSCSI name, detection method, iSCSI alias, and various detected targets.

3. Click **Properties** in **Details**.
4. Properties that can be added are shown under the **General** tab of the **iSCSI Initiator Properties** screen.

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IMPORTANT: The software Initiator configuration and default properties can be changed.

Setting up a Data Store

1. Use the VI Client to select a server, and then select Hardware > Storage under Configuration.
2. Click Add storage.
3. Select Disk/LUN, and then click the Next button.
4. Select the iSCSI device to be used for the data store, and then click the Next button.**Current disk layout** is displayed.
5. Verify the current disk array layout. If there are no problems with the settings, click **Next**.
6. The Disk/LUN Properties are now shown. Enter the data store name.
7. After completing the settings, click **Next**.

IMPORTANT: The data store name is shown in the VI Client. The label must be unique within the current instance of the virtual Infrastructure.

1. Adjust the file system values and area to be used for data storage. (The default is set to storage device for all empty areas).
2. Click Next.
1. When the Completed Settings screen appears, check the data store configuration. If there are no problems with the settings, click the Finish button.

NOTE: Until now, a data store has been created in an iSCSI storage device that can be accessed by Software Initiator.

2. Click the **Change** button.

Confirmation Using Guest OS

Perform the following steps to confirm that the logical disks are recognized by the guest operating system:

Confirmation in Windows Environment

1. Select **Administrative Tools** > **Computer Management** > **Disk Manager** to start.
2. Click **Disk drives** and check the number of logical disks (No. of logical disks assigned to server × No. of access paths from server to individual logical disks) and the respective disk drive names (DISK ARRAY SCSI Disk Device).

NOTE: If nothing is shown, check the software iSCSI Initiator settings for the ESX Server environment, the server-Storage connections, NIC driver settings and so on.

3. Open **Disk Management** and check the number of logical disks (number of logical disks assigned to server).

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Confirmation in Linux Environment

1. To check the number of logical disks (No. of logical disks assigned to application server × No. of access paths from application server to individual logical disks) and the respective vendor and model names (DISK ARRAY), run the following command:

```
# cat /proc/scsi/scsi
```

IMPORTANT: If nothing is shown, check the software iSCSI Initiator settings for the ESX Server environment, the server-Storage connections, NIC driver settings....

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Appendix G

Path Manager Installation

This appendix provides the steps you should follow while installing Path Manager software in a Windows or Linux application server.

For details, refer to *Installing Path Manager Windows and Installing Path Manager Linux.*

Windows Application Server

Follow the steps below to install Path Manager in a Windows application server:

1. Turn off the power supply of the server first and then disconnect all connections between the server and the disk array controller. When SAN boot is enabled, the server should be connected to the disk array controller via a single connection.
2. Power on the server and log in as a user having administrative authority (built-in-administrator for Windows Server 2008) for the server where Path Manager will be installed.
3. When "iSpmStarter.exe" appears, click **Yes**.

Installation

Follow the procedures to install Path Manager.

1. Turn the server off. Completely disconnect the server and Path Manager for Windows.
   If you install on the SAN boot environment, connect the server and Path Manager for Windows with one access path.
2. Turn the server on. Log in as an administrator of the server (if Windows Server 2008, must be built-in administrator).
3. If you are going to setoup Path Manager to 320Fb models, stop "HAS Volume Monitoring Service" before installation, and restart after completion, see "Chapter 6 HAS Volume Monitoring Service".

Figure G-1: When "iSpmStarter.exe" appears, click **Yes**.

If you setup by non-built-in administrator account, the dialog box shown as below may appear.

- If you meet this dialog box, click "Continue".

4. The InstallShield Wizard for Path Manager will start. Depending on the state of your server, the wizard shows one of the two dialogs shown below.

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5. If you are installing Path Manager on the server for the first time, the **Welcome to the InstallShield Wizard for** Path Manager dialog box will be displayed. Click "Next" and continue to procedure (7).

NOTE: If this version of Path Manager is already installed, the Path Manager Maintenance dialog box will be displayed. Click "Cancel." To uninstall the installed Path Manager, refer to ""Install Path Manager""

6. The **License Agreement** dialog box is displayed. Review the license agreement and select the option "I accept the terms in the license agreement." Click "Next."
7. Click "Next."

On installing Path Manager, setup program also installs the option "MultiPath I/O" feature of the Windows. You can confirm which features are installed in the server manager.

8. The Registration window will be displayed, click Next.
9. The **InstallShield Wizard Completed** dialog box will be displayed. Click "Finish."
10. The dialog box shown below will be displayed indicating a reboot is necessary. Click "Yes" to reboot the server.

NOTE: Do not re-setup Path Manager before reboot the server. Be sure to reboot the server if you re-setup Path Manager.

11. After the server reboots, connect Path Manager for Windows to the server. Path Manager automatically recognizes disk subsystems and paths and starts operating.

If your environment is Windows Server 2008 or Windows Server 2008 R2, please apply the following MPIO hotfix:

[The MPIO driver fails over all paths incorrectly when a transient single failure occurs in Windows Server 2008 or in Windows Server 2008 R2]:

http://support.microsoft.com/kb/2522766

The installation of Path Manager is now complete.

Linux Application Server

Install Path Manager

Perform the following steps to install Path Manager in a Linux application server:

1. Navigate to the mount directory.
   (For auto mount, the user is navigated to the auto mount directory.)

```
# cd /media/cdrom
#
```

2. Specify the `-i` option to install the RPM file (run the underscored command).

- If the `--silent` option is not specified, the OS will not be restarted. (The OS must be restarted before you start using Path Manager.)

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- The `--iscsi` option must be specified for the iSCSI connection. Specify the `--iscsi` option if the FC connection and the iSCSI connection are used together.

When the kernel version number is 2.6.18-238.el5 (FC connection)

```
# sh install.sh -i --silent
====== Precheck for SPS Installation / Uninstallation =======
Distribution : RedHat
Architecture : i686
Kernel Version: Linux2.6
Kernel Details: 2.6.18-238.el5
--------- The following packages will be installed. ---------
driver : ./100/RPMS/RHEL5/5.6/IA32/sps-driver-E-5.0.0-
2.6.18.238.el5.i686.rpm
utils : ./100/RPMS/RHEL5/5.6/IA32/sps-utils-5.0.0-0.i686.rpm
============================================================
Preparing... ########################################### [100%]
1:sps-driver-E ##########################################
[100%]
Preparing... ########################################### [100%]
1:sps-utils ############################################# [100%]
patching file rc.sysinit
Starting up sps devices:
Couldn't open /etc/sps.conf. No such file or directory.

I try auto setting...
Wait.
parsing... device:/dev/dda (OK)
parsing... disk-info: DISK ARRAY ,0000000935000734,00001 (OK)
parsing... LoadBalance:D2 (OK)
parsing... path-info:0 Host:scsi:8 Channel:0 Id:0 Lun:0
Priority:1 Watch:Enable Status:ACT (OK)
parsing... path-info:7 Host:scsi:7 Channel:0 Id:0 Lun:0
Priority:2 Watch:Enable Status:HOT (OK)
Wait until all /dev/ddX is made..........END
dd_daemon (pid 3963) is running...
sps Install Completed......
#
Broadcast message from root (Thu Feb 25 14:15:57 2010):
The system is going DOWN for reboot in 1 minute!
```

3. When the installation is completed successfully, the message, `sps Install Completed` (shaded area) is reported. If this message is not shown, it indicates the installation has failed, in which case, see S*oftware P*ath Manager *for Linux User's Manual* for information and actions to be taken.
4. When the installation is finished successfully, the system restarts after 1 minute. Check if the OS is operating successfully.

The installation of Path Manager is now complete.

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MSCS with Windows Server 2003

When you are using Microsoft Cluster Service (MSCS) in the Windows Server 2003 environment, the value set to each server by the MSCS specifications must match the SnapSAN Manager Target ID and LUN (number) values recognized by each server. Cluster setup does not work when different values are set. [KB331801] Cluster setup may not work when you add nodes.

For details, refer to the following URL:

http://support.microsoft.com/kb/331801

Target ID

The following describes a connection method related to setup of matching values as the Target IDs of disk array controller controllers recognized by the server.

- When directly connecting server (HBA) and disk array controller,Set matching values to the Loop Switch ID of the disk array controller.

The Switch ID that is set becomes the Target ID recognized by the server.

Similarly, when there are multiple connection paths between servers and disk array controllers, set the same values to the Loop Switch IDs of all controller ports to be connected.

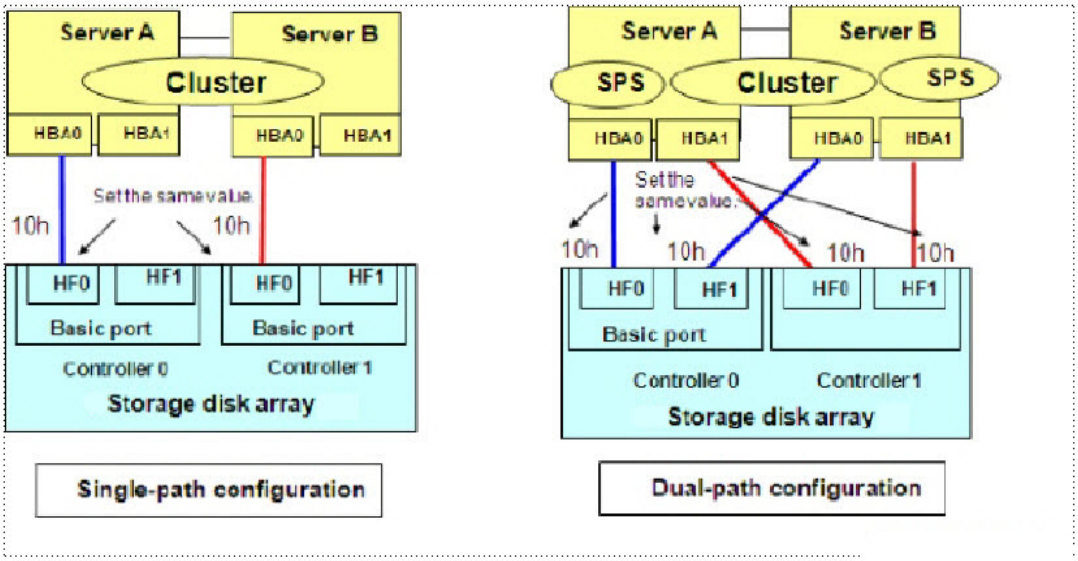

Figure H-1: Direct Connection

- When connecting to FC switches, such as N8190-119 in Loop Topology

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Set identical Loop Switch ID values to controllers of the same disk array controller.

The Switch ID that was set becomes the Target ID recognized by the server.

When multiple disk array controllers are connected to FC switches, different Loop Switch ID values must be set to each disk array controller. Normal operation will not occur if matching values are set.

NOTE: Because FC switches in a Loop Topology require different Loop Switch IDs within FC switches, a configuration cannot be built using just one FC switch.

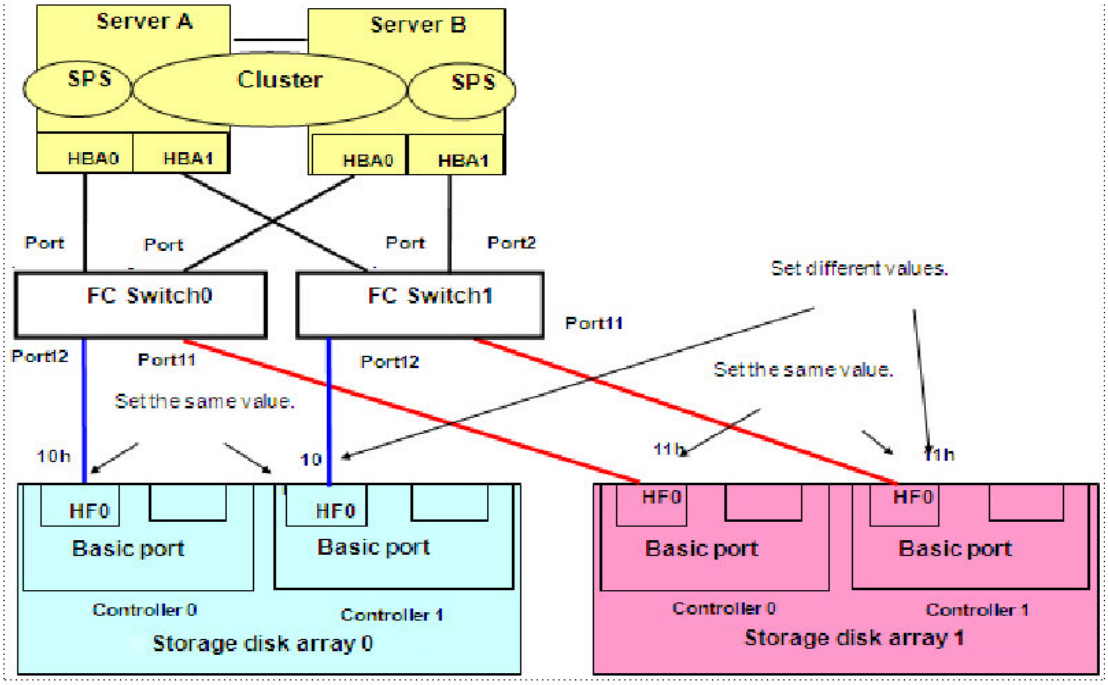

Figure H-2: Connecting to Loop Topology FC Switch

- When connecting to a Fabric Switch, such as N8406-040/042

As shown in the figure below, for each Fabric Switch or each Zoning group, connections from servers and disk array controllers must be linked to the same port number on each switch.

Target IDs starting from 0 are assigned to targets that are recognized by the server starting from the lowest N_Port ID value (lowest port number of switch).

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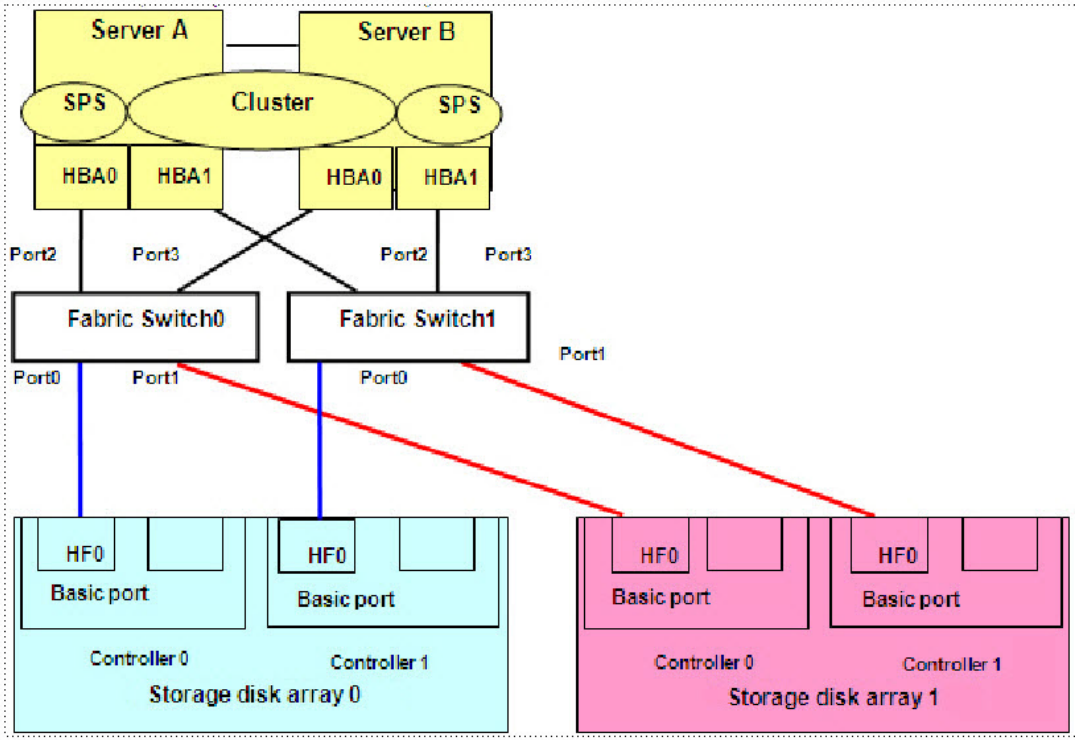

Figure H-3: Connecting to Fabric Switch

Table H-1: Connection of Switch

Switch No. Port No.	Connected Device	Switch ID	Target ID	
Switch0 - Port0	iStorage0-Cont0	10h	0	Recognizes targets connected to fabric switch in detected order and assigns Target ID from lower switch port number. Target ID for the first detected target will be 0. Secondly, detected target will have "Target ID = 1 and so on.
Switch0 - Port1	iStorage1-Cont0	12h	1	
Switch0 - Port2	server A-HBA0	-	-	
Switch0 - Port3	server B-HBA0	-	-	
Switch1 - Port0	iStorage0-Cont1	11h	0	
Switch1 - Port1	iStorage1-Cont1	13h	1	
Switch1 - Port2	server A-HBA1	-	-	
Switch1 - Port3	server B-HBA1	-	-	

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IMPORTANT: If you connect wrong Path Manager to Ports of Switch0 and Switch1, you cannot perform cluster setup since Target IDs differ between controller 0 and controller 1.

Swtich0 - Port0: Path Manager 0 - Cont0 Target ID 0
Swtich0 - Port1: Path Manager 1 - Cont0 Target ID 1
Swtich1 - Port0: Path Manager 1 - Cont1 Target ID 0
Swtich1 - Port1: Path Manager 0 - Cont1 Target ID 1

Logical Unit Number

This section describes a method for setting matching values as the Logical Unit Number (LUN) of disk array controllers recognized from the server.

Each disk array controller includes an access control function that masks logical disks and maps LDNs starting from LUN0. If this access control is not being used, the logical disk number (LDN) of a logical disk configured in a disk array controller becomes the Logical Unit Number (LUN) that can be accessed from the server.

When access control is used, it becomes possible to change LUN (number) that can be accessed from the server.

For example, when LDN00 to 03 are in a disk array controller, access control can set LDN00 = LUN00, LDN01 = LUN01, LDN02 = LUN02 as recognized from Server A and LDN00 = LUN01, LDN01 = LUN02, LDN03 = LUN00 as recognized from Server B. In this case, there are different LDNs for the LUN that is recognized from Server A and the LDN that is recognized from Server B.

- When access control is not used

No settings are necessary.

- When access control is used

When you are setting access control, LDNs within a disk array controller must be set so that the same LUN (number) is recognized from each server.

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Appendix I

SnapSAN Manager Embedded

SnapSAN Manager Embedded Operating Environment

A Web browser and Java Runtime Environment (JRE) must be installed in the system before you start using SnapSAN Manager Embedded.

Table I-1: Configuration Options

Configuration	Description
Operating System	Microsoft Windows XP Professional Edition (from without any Service Pack to Service Pack 3) Microsoft Windows XP Professional x64 Edition (without any Service Pack and Service Pack 2) Microsoft Windows Vista Business (from without any Service Pack to Service Pack 2) Microsoft Windows 7 Ultimate (without any Service Pack and Service Pack 1) Microsoft Windows 7 Ultimate x64 (without any Service Pack and Service Pack 1) Microsoft Windows 7 Enterprise (without any Service Pack and Service Pack 1) Microsoft Windows 7 Enterprise x64 (without any Service Pack and Service Pack 1) Microsoft Windows 7 Professional (without any Service Pack and Service Pack 1)

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Configuration	Description
	Microsoft Windows 7 Professional x64 (without any Service Pack and Service Pack 1) Microsoft Windows Server 2003, Standard Edition (from without any Service Pack to Service Pack 2) Microsoft Windows Server 2003 R2, Standard Edition (without any Service Pack and Service Pack 2) Microsoft Windows Server 2003, Standard x64 Edition (without any Service Pack and Service Pack 2) Microsoft Windows Server 2003 R2, Standard x64 Edition (without any Service Pack and Service Pack 2) Microsoft Windows Server 2003, Enterprise Edition (from without any Service Pack to Service Pack 2) Microsoft Windows Server 2003 R2, Enterprise Edition (without any Service Pack and Service Pack 2) Microsoft Windows Server 2003, Enterprise x64 Edition (without any Service Pack and Service Pack 2) Microsoft Windows Server 2003 R2, Enterprise x64 Edition (without any Service Pack and Service Pack 2) Microsoft Windows Server 2008 Standard (without any Service Pack and Service Pack 2) (*) Microsoft Windows Server 2008 R2 Standard (without any Service Pack and Service Pack 1) (*) Microsoft Windows Server 2008 Enterprise (without any Service Pack and Service Pack 2) (*) Microsoft Windows Server 2008 R2 Enterprise (without any Service Pack and Service Pack 1)(*) Red Hat Enterprise Linux 5.5 to 5.7 (IA32/EM64T) Red Hat Enterprise Linux 5.5 to 5.7 Advanced Platform (IA32/EM64T) (*) Products without Hyper-V are also supported. The Server Core installation option is not supported.
Web Browser	**Windows** - Microsoft Internet Explorer Version 7 to 9 (32-bit versions) **NOTE:** For Windows Vista or Windows Server 2008, only Version 7 or later are supported. For Windows 7 and Windows Server 2008 R2, only Version 8 or later are supported. **Linux**: - Firefox 3.0, 3.5, and 3.6
Java Runtime Environment (JRE)	One of the following JREs (32 bit version) is necessary. From JRE 6 update 17 to JPE 29. When using Internet Explorer Version 9, be sure to use JRE 6 update 25 or later.
Memory	**Windows** - 67 MB or more. **Linux** - 70 MB or more.
Disk Capacity	No program needs to be installed. **NOTE:** A maximum of 30 MB is used for reporting log files.
Display	XGA (resolution 1024 × 768) or greater

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The information above is the supported operating environment for the default settings of SnapSAN Manager V7.4.

The following operating systems are supported under JRE6 (32 bit version) from JRE 6 update 17 to 29:

Operating Systems
Windows XP Professional Edition
Windows XP Professional x64 Edition
Windows Vista Business
Windows 7 Ultimate
Windows 7 Enterprise
Windows 7 Professional
Windows 7 Ultimate x64
Windows 7 Enterprise x64
Windows 7 Professional x64
Windows Server 2003, Standard Edition
Windows Server 2003 R2, Standard Edition
Windows Server 2003, Standard x64 Edition
Windows Server 2003 R2, Standard x64 Edition
Windows Server 2003, Enterprise Edition
Windows Server 2003 R2, Enterprise Edition
Windows Server 2003 Enterprise x64 Edition
Windows Server 2003 R2, Enterprise x64 Edition
Windows Server 2008 Standard
Windows Server 2008 R2 Standard
Windows Server 2008 Enterprise
Windows Server 2008 R2 Enterprise
Red Hat Enterprise Linux 5.5
Red Hat Enterprise Linux 5.5 Advanced Platform

IMPORTANT: Do not use any unsupported OS and JRE combinations.

When any product that uses Java Runtime Environment (JRE) is already installed in the environment where SnapSAN Manager Embedded (WebGUI) is used, the product and SnapSAN Manager Embedded can live together if neither SnapSAN Manager Embedded (WebGUI) or the product is operated on another server or PC.

The latest version of JRE installed in the environment supports SnapSAN Manager Embedded (WebGUI) as well as the product.

Use the JRE contained in the SnapSAN S3000/S5000 Documentation Software CD for first installation. However, it is recommended to use the latest version among the supported JRE versions after the installation because the supported versions may include a version for which security vulnerability issue is reported.

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For details about security vulnerability see:

- US-CERT (http://www.us-cert.gov)
- My Oracle Support (https://support.oracle.com/CSP/ui/flash.html)

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CHAP

CHAP

Challenge Handshake Authentication Protocol or CHAP is an authentication method. This appendix describes the CHAP authentication and its settings.A random text string called a “challenge” is sent from the server to the client, and the client uses it as the basis for encrypting its own “Secret” (password), which it returns. Because the server has the client's Secret (password), it performs the same encryption and compares the result to the encrypted code returned from the client to enable authentication of users.

Constraints on Secrets

- Although this device enables use of 12- to 32-character string lengths, typically Initiator restricts the CHAP Secrets to 16-character (128-bit) strings. (As of February 2009)
- Do not set the same values to the Initiator CHAP Secret and the target CHAP Secret that are used for bidirectional CHAP authentication.

Description of Operation Modes

1. CHAP authentication for Initiator

   Only authentication of the application server (Initiator) from the disk array unit (iSCSI target) is performed.

   Only target CHAP Secret is set.

2. Bidirectional CHAP authentication

Authentication is performed mutually for the disk array unit (iSCSI target) and the application server (Initiator). Both a target CHAP Secret and an Initiator CHAP Secret are set.

NOTE: Microsoft iSCSI Software Initiator refers to this as "Mutual CHAP"

CHAP Username Setting

1. Set the target name (when it can be set) as the CHAP username (target side).
2. Unless otherwise specified, set the Initiator name as the CHAP username (Initiator side).

(If using another name, maximum length is 256 characters.)

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Correspondence between Microsoft iSCSI Software Initiator Secret Setting and iSMCLI

1. CHAP authentication for Initiator

<Microsoft iSCSI Software Initiator> **iSCSI Initiator Properties "target"**

   a. Log on

   b. Log on to target

   c. Advanced Settings (General tab) screen

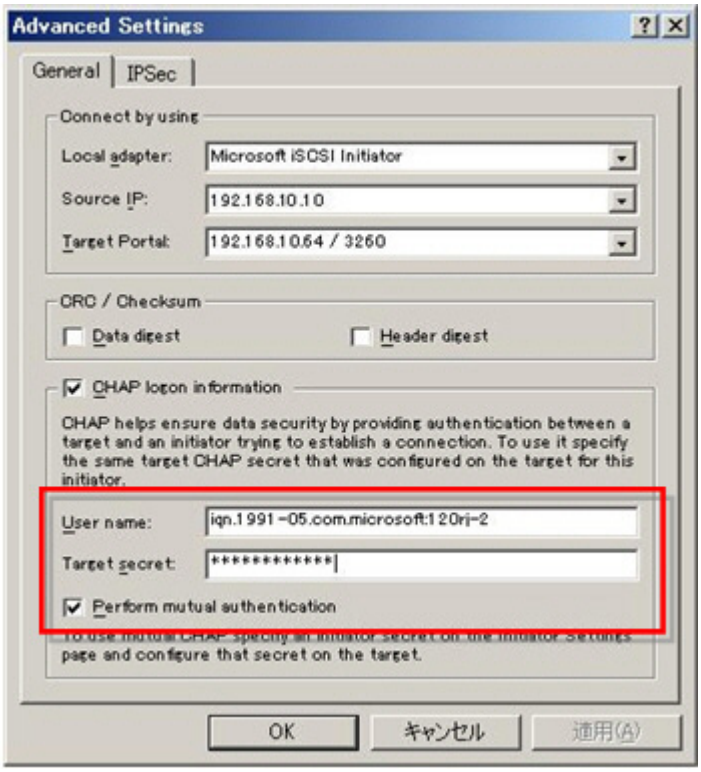

Figure J-1: iSCSI Initiator Authentication Setting (General Tab) Screen

iSMCLI

```
iSMcfg setldsetchap -ldsetname ldset name -initiatorpwd CHAP Secret
for Initiator
```

1. Bidirectional CHAP authentication (mutual CHAP authentication)

<Microsoft iSCSI Software Initiator> iSCSI Initiator Properties (General tab) screen

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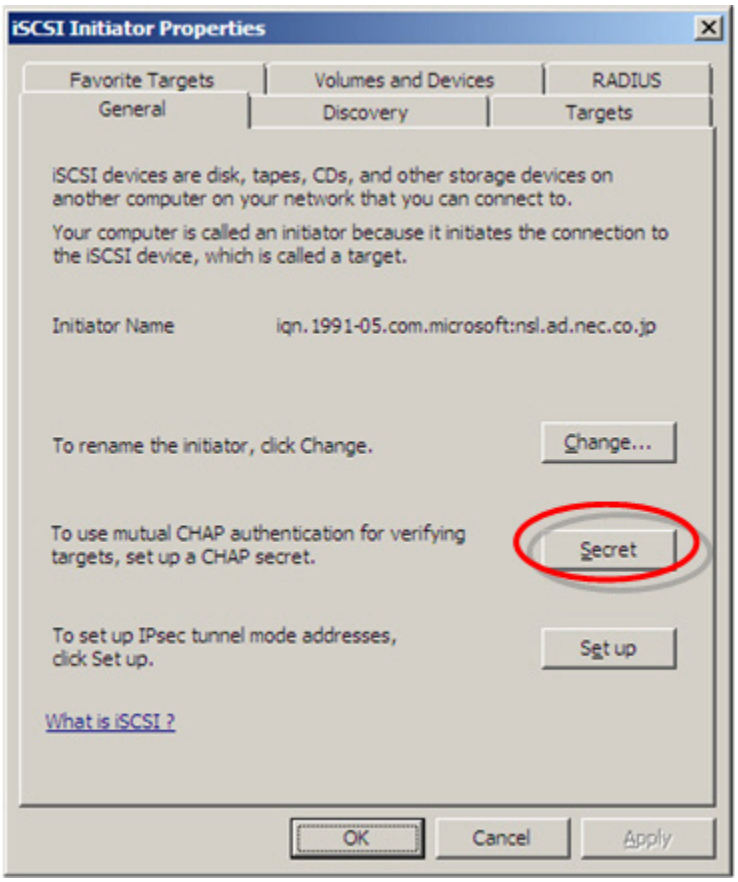
iSCSI Initiator Properties
Favorite Targets
Volumes and Devices
RADIUS
General
Discovery
Targets
iSCSI devices are disk, tapes, CDs, and other storage devices on another computer on your network that you can connect to.
Your computer is called an initiator because it initiates the connection to the iSCSI device, which is called a target.
Initiator Name
iqn.1991-05.com.microsoft:nsl.ad.nec.co.jp
To rename the initiator, click Change.
Change...
To use mutual CHAP authentication for verifying targets, set up a CHAP secret.
Secret
To set up IPsec tunnel mode addresses, click Set up.
Set up
What is iSCSI ?
OK
Cancel
Apply

Figure J-2: iSCSI Initiator (General Tab) Screen

2. Click **Secret** to view the **iSCSI Initiator** window.

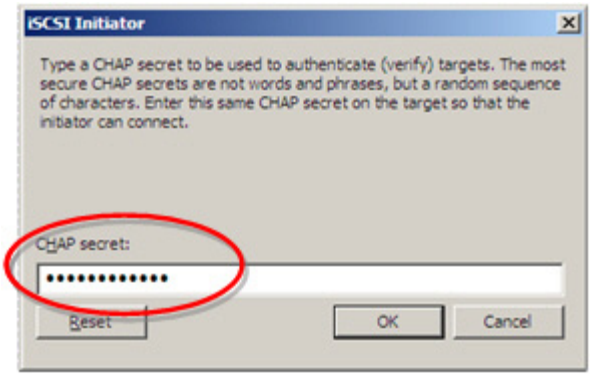
iSCSI Initiator
Type a CHAP secret to be used to authenticate (verify) targets. The most secure CHAP secrets are not words and phrases, but a random sequence of characters. Enter this same CHAP secret on the target so that the initiator can connect.
CHAP secret:
Reset
OK
Cancel

Figure J-3: iSCSI Initiator CHAP Secret Input Window

iSMCLI

```
iSMcfg setldsetchap -ldsetname ldset name -initiatorpwd CHAP Secret for
Initiator -targetpwd bidirectional CHAP Secret
```


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